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THE ORIGIN, DEVELOPMENT, DEGENERATION AND DEATH OF THE TUBERCLE OF TUBERCULOSIS.

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Although I do not intend to enlarge in this paper upon the pathological anatomy of those organs which, in the human organism, are mostly found to be affected by tuberculosis, some general remarks on this subject are nevertheless demanded, in order to serve as a basis for a thorough discussion on the relationship existing between the bacterium tuberculosis and the particular neoplasm which, in the form of small tubercles, characterize the disease.

The discovery of Villemin of tubercles artificially produced in various organs of certain animals by the inoculation of tuberculous matter, in 1866, and more particularly that of the bacillus tuberculosis by Koch, in 1882, could not but increase the interest which the medical profession has always evinced on the subject of tuberculosis, whilst it gave rise to new, and, perhaps, more thorough investigations into the

pathology of this fatal disease, than had been made before. These more recent investigations, including the labors of Villemin and Koch, into the nature and cause of tuberculosis called forth very numerous verbal and written discussions, in which the subject was thoroughly reviewed in all its aspects; so that, at the present time, almost every physician may be familiar with the history of this disease, as well as with the different theories, to which, in the course of time, it had given rise. For this reason I shall forbear making any special remark on this subject, but confine myself to only recalling to the mind of the reader that tuberculosis was formally regarded by many physicians, and still is by some, as a disease distinct from that generally known as pulmonary phthisis, catarrhal or cheesy pneumonia, etc. But although some differences may exist in the course and the accompanying clinical symptoms of these two affections of the lungs, it appears that at the present time they are by the great majority of physicians regarded as identical in their nature. My own investigations into the pathological anatomy of tuberculosis corroborate the correctness of this view, for both affections are from their beginning undoubtedly characterized by the formation of small tubercles identical in origin and structure, though in the one affection these tubercles remain confined to the lungs, whilst in the other they are also met with in other organs. Before continuing, however, our remarks on the identity of cheesy pneumonia and miliary tuberculosis, it appears to me proper to first consider the origin, development, and structure of the so-called miliary tubercle itself, as well as the different changes which it is observed to undergo during the course of the disease in question.

In order to obtain a correct idea of the particular structure

and nature of any pathological formation, it is essential that we should have some knowledge of the mode of its origin and development. Such a knowledge is particularly required in the investigation of the miliary tubercle, where the object in view is not limited to its structure and mode of origin, but, moreover, extends to the inquiring into the particular cause by which this neoplasm is called into existence. Accordingly, in commencing these investigations we must direct our attention not only to the smallest, or most recently formed tubercles, but, moreover, to every pathological change, that might be observed to have occurred in the surrounding, apparently healthy, parenchyma. Although the mode of formation of the tubercles is the same in the so-called cheesy pneumonia as in the more typical pulmonary miliary tuberculosis, the most suitable material for the microscopical study of the origin of the tubercles, will nevertheless be found in the lungs, or even other organs, of those cases affected by the last mentioned form of tuberculosis, as here, not unfrequently, portions of the respective organ are met with, in which the disease has not yet passed beyond its incipient stage. Before, however, considering the probable origin and development of the miliary tubercle, let us take a glance at the structural character which it presents when fully developed. The most suitable material for this purpose will be found in the sections, taken from lungs solely affected by miliary tuberculosis, and containing tubercles differing in size, and representing different stages of their growth.

In examining such sections under the microscope it will be seen that the miliary tubercle in the beginning of its formation appears to be limited to one alveolus, whence, however, it soon extends its growth to the adjacent alveoli

of the same terminal lobule. It is thus that most of the tubercles, met with in miliary tuberculosis, even the smallest that can be seen by the naked eye, are found to comprise a smaller or larger number of alveoli. In the formation of the larger tubercles, met with in the lungs of cases of cheesy pneumonia, the tubercular growth extends through the interstitial connective tissue to the alveoli of the neighboring terminal lobules. In this manner one of the larger lobules of the lungs, formed by a number of terminal lobules, may eventually be rendered tuberculous. The tubercular growth, however, may even extend beyond this limit and not be arrested until it has invaded a smaller or larger number of the larger lobules, giving rise to one of those tuberculous masses, or nodules, above mentioned. The formation of the larger tubercles or tubercular nodules or masses may here and there be owing to the growth and fusion of adjacent smaller ones, though my own observations have taught me that generally the tubercle of tuberculosis, whether small or large, grows from one centre in a centrifugal direction.

In examining one of the medium-sized or even larger miliary tubercles, contained in a thin section of tuberculous lung, it will be found to be composed of different kinds of cells and other anatomical elements. Whilst its main bulk, including the centre, consists of the regular tubercle cells, averaging in diameter about 1-75 mm., and of an irregular, though epithelioid form, probably produced by their mutual pressure, the cells, observed at its periphery, are smaller in size, resembling rather in form and character the so-called lymphoid or exudation cells. In many tubercles, and imbedded between the regular tubercle-cells, a limited number of cells are met with, distinguished by their unusually large size. These are the so

called giant-cells of the tubercle, *apparently* consisting of large masses of protoplasm containing numerous nuclei.

In addition to the cells thus described, however, there is another kind met with, especially in the larger and older tubercles, to which I have already referred in the beginning of this paper. They are best made visible by treating a thin section of tuberculous tissue with a solution of caustic potassa of a strength from 10 to 30 per cent., by the reaction of which all the anatomical elements contained in the section are rendered clear, and eventually destroyed, with the exception of the elastic tissue fibres and these peculiar cells. The latter then appear round or oval in form, mostly larger than the regular epithelioid tubercle cells, and always filled with larger and smaller fat globules. In many tubercles, however, these cells present a dirty brownish or blackish appearance, produced by a smaller or larger number of black pigment granules and minute fat crystals which they contain in addition to the fat globules.

Besides the above-mentioned cellular elements, many of the larger miliary tubercles contain not only the original elastic tissue fibres of the inter-alveolar septa, but, moreover, a connective tissue network, or reticulum, which is regarded by some authors as the stroma of the tubercular neoplasm.

In order to properly understand the relationship in which these different elements, composing the miliary tubercle, stand to one another, it is essential to ascertain the sources from which they are derived. This, however, is a task more difficult to accomplish than one might at first glance imagine. It is for this reason that, though this subject has been quite extensively investigated, some differences of

opinion concerning the true origin of the tubercle of tuberculosis still exist among pathological anatomists. The best mode of ascertaining the true sources of these elements consists, of course, as I have already pointed out above, in closely studying the first pathological changes taking place in the intertubercular parenchyma of the lungs, which generally manifest themselves in a multiplication of the cells of one or the other anatomical element. From these primarily formed cells, then, the further development of the tubercle may be pursued and studied in specimens exhibiting the different stages of its growth.

In examining a thin section of miliary tuberculous lung the first signs of the formation of a tubercle may be recognized in a protuberance arising from the wall of one or the other alveolus. From this protuberance the young tubercle is observed to bud, in the form of a little round or conical tumor, into the cavity of the respective alveolus. Generally, the base from which the little tumor arises, exceeds in dimension the tumor itself, but not unfrequently the latter may also be observed to be attached to the wall of the alveolus by a contracted part, or so-called neck. By a continued growth the neoplasm eventually fills up the whole cavity of the alveolus. In most instances, the growth of the base of the tubercle extending over the wall of the alveolus exceeds in activity that of its summit, in consequence of which the tubercle becomes eventually attached to the whole wall of the alveolus, thus completely filling its cavity Not unfrequently, however, though filling up the cavity of the alveolus, it is observed to arise from a smaller base, and with a part of its body detached from the rest of the alveolar wall. In the examination of thin sections of

tuberculous lung, not only tubercles partially detached from the wall of the alveolus, but also others, having apparently no connection at all with the latter, are frequently observed. In the latter cases, this entire want of connection between the tubercle and its alveolar wall is easily explained by presuming that during the making of the section the knife passed through the detached portion of the body of the tubercle. As the miliary tubercle grows in a centrifugal direction the particular mode of its origin with the different stages of its development or growth are, of course, best exhibited at the periphery of the tubercle.

But not only in sections taken from lungs of cases of miliary tuberculosis, the particular mode and origin of development of the tubercle is observed to take place in the manner I have described above, for the same is also observed in the growth of those tubercular nodules or masses met with in the lungs of cases of chronic tuberculosis or so-called cheesy pneumonia. In sections taken from such lungs, the young tubercles are likewise seen to arise from the walls of the alveoli, bordering the nodule or tubercular mass, or from those bordering the smaller or even larger bronchioles, where they arise in the form of nipple-shaped buds. In examining attentively the borders of these tubercular masses, some inter-alveolar septa are almost always met with that are distinguished by spindle-shaped enlargements, projecting into their respective adjacent alveolar cavities, and resembling the minute miliary tubercles surrounding the small arteries, or arterioles of the pia mater in tuberculosis of this membrane. In some instances, a tubercular bud is already seen to arise from one side of the enlargement, and to project into its alveolar cavity; in others again,

a tubercle is seen to arise upon a moderately extended base from the walls of one or the other alveolus, and to extend into the infundibular cavity which is the more or less filled up by the neoplastic growth. Sometimes, even, I have observed the tubercle to extend through the infundibulum into an adjacent alveolus. When during the cutting of the section of such a tuberculous lung, the knife passes in a transverse, or even slightly oblique direction, through one of these tuberculous polypi, the section of the latter will, of course, be found to lie free in the cavity of its respective alveolus. Thus it happens that in the immediate neighborhood of these tubercular masses sections of small tubercles, distinctly composed of epithelioid cells, and in no way attached to the walls of their alveoli, are not unfrequently met with. As the diameter of these sections of minute tubercles hardly ever reaches that of the alveoli in which they lie, but on the contrary is mostly considerably smaller than the latter—in some instances not more than one-third—there will be always left a smaller or larger empty space between their borders and the alveolar walls. This circumstance, together with their being composed of distinct epithelioid cells, make them resemble minute masses of desquamated epithelium, such as are asserted by some authors to be present in the alveoli of the lungs in cases of the so-called catarrhal pneumonia, the supposed forerunner of pulmonary phthisis. I hesitate not to confess that when I first beheld these bodies I was, myself, inclined to regard them as accumulations of such desquamated epithelial cells, until closer investigation showed me their tubercular origin. In other instances, however, similar minute aggregations of these epithelioid cells may be observed to be attached to the alveo-

lar wall by short and quite narrow pedicles, resembling minute tubercles arising from the epithelium of the alveolus. To these I shall refer again hereafter.

In the foregoing paper I have described the forms in which the miliary tubercles are first seen to arise from the internal surfaces of the walls of the alveoli, but omitted to mention the particular anatomical element directly concerned in their production; in other words, whether they owe their origin to the connective tissue cells of the vessels ramifying between or in the alveolar walls, or may be regarded as a proliferation of the epithelial cells lining the alveoli. As regards this subject, some difference of opinion appears still to exist among pathological anatomists, for while some of them regard the tubercle as a product of inflammation, that is, arising from the cells of some connective tissue, or even from cells migrated from the blood or lymph into the walls of the alveoli, others regard them as a product of the epithelium lining the pulmonary air vesicles. In considering the epithelioid form of these cells, composing the greater part of the miliary tubercle, it appears at first sight difficult to ascertain the true histological origin of the latter. The difficulties met with in the investigation of this subject, however, will be found to diminish and to finally disappear, if our microscopical examinations are sufficiently thorough, and made on a great number of preparations, in order to serve as a reliable basis for sound inductive reasoning. The best way of forming a correct idea of the relationship existing between the different tubercle cells, that is, between those derived from the connective tissue-cells of the vessels, and the others derived from the epithelium of the alveoli, certainly consists in taking into proper consideration their

origin in those primary cellular layers of the germ, or blastodermic vesicle, from which the different tissues of the embryo take their start. Let us pursue, therefore, this course, and briefly review the development of the human lungs, more especially that of their parenchyma, such as it is observed in the earliest stages of embryonic life.

The *blastoderma*, or blastodermic vesicle, is formed as we know from those cells resulting from the segmentation of the yelk of the egg, which spread themselves in the form of a single layer over the internal surface of the egg-membrane, the *zona pellucida*. At a certain part of this layer, however, an accumulation of these cells in the form of an hour-glass-shaped disk, representing the so-called "*germinal area*" (*area germinativa*), has taken place, in which the embryo originates. The next phenomenon observed in the development of the latter is the separation of the *blastoderma* into two distinct layers, which may be regarded as the first act of differentiation taking place, for the reason that from the outermost of these layers, called the *ectoderma*, all organs performing the functions of animal life will be formed, while the innermost, the *entoderma*, give origin to all organs destined to perform the functions of vegetative life. Besides this difference of function, however, already at this early period of embryonic life, other differences have been observed to exist, not only in the size, form and general appearance of the cells of these blastodermic layers, but, moreover, in some of their physical properties; for while the cells of the *ectoderma* are small, clear and smooth, and absorb but *feebly* coloring matter, such as carmine, those of the *entoderma* are larger and darker, fewer in number, filled with minute granules, and absorbing the carmine quite intensely; besides, they are rendered darker by the reaction to osmic acid than the ectoderm-cells on account of the minute fat-globules which

they contain. This difference of degree in the absorption of coloring matter, or in the reaction to osmic acid is, according to *Haeckel*, already observed in the first pairs of cells, resulting from the cleavage of the ovum.* As soon as the first morphological changes, indicating the formation of the embryo, take place in these germinal layers, another layer appears between them. This is the *mesoderma*, or so-called " motor and germinative " layer, from which all the parts of the body consisting of connective tissue, muscles and nerves, together with the urinary and generative organs are formed. During the primary stage of development of the embryo, however, the *mesoderma*, also, splits up into two subordinate layers, the outermost of which, the *lamina inodermalis* (Haeckel) is destined for the formation of the corium, muscles of the trunk and extremities, and the bones, while the innermost, the *lamina inogastralis* (Haeckel) gives origin to the muscles and fibrous coats of the intestines and their glands, the muscles of the pharynx, æsophagus, stomach and other appendages of the alimentary canals, as well as to the heart and the most important blood vessels. The divisions of the *mesoderma* may be regarded as another act of differentiation concerning the functions of those organs for which its two layers are destined, *i. e.*, the one for organs of animal, the other for organs of vegetative life. Thus the original *blastoderma* now consists of four distinct layers, which, counted from the outside, have been denominated by Haeckel as follows: 1. *Lamina neurodermalis* (*ectoderma*); 2. *Lamina inodermalis*; 3. *Lamina inogastralis* (*mesoderma*); 4. *Lamina mycogastralis* (*entoderma*).

As regards the origin of the *mesoderma*, however, differ-

* H. E. Haeckel.—"*Anthropogenie oder Entwicklungsgeschichte des Menschen.*" 3rd edition, p. 172.

ences of opinion exist among the different investigators of this subject, and the question is, as yet, not decided, whether the middle layer is derived from *ecto-* or *entoderma*, or whether its subordinate layers may not be derived from both, that is, the outermost from the *ectoderma*, and the innermost from the *entoderma*. For certain reasons, I am inclined to give preference to the statements and views of A. Koelliker,* one of the oldest and most reliable investigators, who regards the *mesoderma* as being derived from the *ectoderma* alone.

Having by the above review of the formation of the primary cellular layers of the embryo now obtained a basis upon which to rest our arguments concerning the origin and signification of the different kinds of cells of which the miliary tubercule is composed, we may turn our attention to the origin and development of the lungs, representing those organs in which the tubercle is most frequently met with. In the embryo the lungs are found to originate in the upper part of its primary alimentary canal, called the "foregut," where they first appear in the form of a minute dilatation, which, by gradually lengthening, assumes the form of a tube which, in its turn, gives rise to two similar tubular processes. While the latter represent the primary larger bronchi, the parent tube represents the trachea. From each of these primary bronchi, then, two other subordinate bronchi originate which, again, in their turn, give rise to other subordinate branches, until, by the continued formation of new and smaller ones, the whole bronchial system is eventually developed. The primary alimentary canal, from which the trachea and bronchi take their origin, is composed, as we know, of two blastodermic layers, viz.: the *entoderma*, and the inner division of the *mesoderma*, the

* A. Koelliker.—"*Entwicklungsgeschichte des Menschen und der hoeheren Thiere.*" 2d edition, p. 268.

lamina inogastralis of which the former is represented by the epithelium and the latter by the fibrous envelope of the canal. These same layers, of course, build up the trachea and bronchi. According to Koelliker, however, in the beginning of the development of the bronchial system, the *entoderma* alone takes part in the formation of the bronchial branches, which bud, so to say, into the surrounding cellular mass of the *lamina inogastralis.* This phenomenon seems to indicate that the development of the bronchial system mainly proceeds from the *entoderma.* Soon after, of course, the *lamina inogastralis* also takes part in the process of formation of the bronchial ramifications, so that each new bud, arising from the end of its predecessor, consists already of two membranes ; though, even now, the epithelium of the bronchial tubes still takes the lead in the formation of new buds. By the successive formation of new subordinate bronchial tubules the whole bronchial system appears developed at the sixth month. During the development of the latter the newly formed bronchial tubules present at their ends spherical dilatations, designated by Koelliker "*primitive gland-vesicles*," and from which, in turn, the new bronchial buds arise, but which as yet do not represent the pulmonary air vesicles or alveoli of the fully developed lungs. Already in the fourth month, Koelliker found all the bronchial tubules, with the exception of their vesicular terminations, lined by a ciliated epithelium. In the sixth month, finally, the alveoli are formed in the manner that the vesicular buds, arising from the last-formed primitive gland-vesicles do not separate any more from one another during their growth into pedunculated vesicles, but remain connected to one another, opening besides into a common space which represents the so-called "infundibulum." These terminal vesicles are, furthermore, distinguished by a flat pavement-like epithelium.

The above sketch which I have drawn of the development of the lungs in the earlier stages of embryonic life, shows that, while the greater part of these organs, comprising the fibrous and muscular elements of the larger and smaller bronchi, together with the walls of the alveoli, as well as the larger and smaller blood vessels, are derived from the *mesoderma*, which itself is a product of the original "animal layer" of the blastodermic vesicle, the *ectoderma*—the remaining part consisting only of the epithelia of the bronchi and alveoli may be traced back to the "vegetative layer," the *entoderma*. But as the miliary tubercle is found to be built up chiefly by comparatively large cells, epithelioid in form, it would almost appear to be a product of the epithelial cells lining the alveoli. This, however, is not the case, for, though these tubercle cells do, to a certain extent, resemble in form those of an epithelium, they, nevertheless, as we shall see directly, are derived from another source. But even if we should fail to trace them back to another tissue than the alveolar epithelium, we might point to a certain phenomenon, observed in the life history of the miliary tubercle, which clearly shows that this neoplasm can not be the product of an epithelium. I refer to the phenomenon observed in those cases of so-called "fibrous miliary tubercles," in which the tubercle cells become organized into a tissue of a higher grade, into a sort of connective, or so-called "cicatricial tissue." This process of organization, as we know, is never observed to take place in the cells of an epithelium, or in those of a gland, but, on the contrary, always involves the cells of connective tissues, or their descendants. Nor is it limited to cases of fibrous tubercles, for, in those indurated portions of lungs of cases of chronic tuberculosis, also, tubercle cells may be seen to elongate and to be converted into a ort of coarse connective tissue.

The best example, however, for showing that the miliary tubercle is not a product of an epithelium, are those tubercles met with in the peritoneal layers of the mesentery and intestines, but still more those which are formed around the small blood vessels of the pia mater. More than four years ago, I made a number of examinations of the tubercles surrounding the blood vessels of this membrane, and distinctly saw them arise from the connective tissue cells of their adventitia. Some of these vessels were so minute, that, though they were stained with picro-carmine, it was difficult to distinguish them by the unaided eye. Suspecting at first the tubercles to arise from the endothelium of these vessels, I directed my special attention to this layer, the cells of which were easily distinguished in the smaller arterioles, but failed in my expectations, as I found, in every instance examined, the endothelium entirely free from tubercle cells, while in the adventitia they were met with in all stages of development. Arising from the cells of the adventitia of the arterioles, or even from the nuclei of the capillary vessels— which generally are also surrounded by a thin layer of cell protoplasm—the tubercle cells multiply by division, and form tubercles too minute to be seen by the naked eye. Though of a moderate diameter, when first arising from the connective tissue cells of the adventitia, they soon enlarge, until they have attained the diameter of those cells, composing a fully developed tubercle, while by mutual pressure they are rendered polygonal in shape resembling then the cells of an epithelium. It must not be overlooked, however, that there are many tubercle-cells, which present very irregular forms, without resembling in any point a regular epithelial cell. The minute tubercles, when first formed, are observed to rest upon the wall of the vessel in the form of minute irregularly shaped masses, though by

continued growth they finally surround it, and assume that ovoid form characteristic of the tubercles of these vessels. The diameter of these tubercles, when fully grown, are generally proportionate to those of the individual vessels upon which they are found. The miliary tubercles met with in the peritoneal layers of the mesentery must, as there exists no epithelium in their close vicinity, of course, arise from the cells of some connective tissue, or, perhaps, as Rindfleisch states, from the endothelium of the lymphatics, or blood vessels. As regards the tubercles of the small intestines I may state, that I have endeavored to trace the connection of these tubercles by carefully separating under water, and with the aid of a strong loupe, the different layers of the intestines. In a number of instances I found the little tumor arising from the fibrous, and extending through the muscular coat. In others, however, as may also be seen in thin vertical sections of the intestines passing through the tubercle, the latter involved the fibrous layer of the mucous membrane where it may finally by its degeneration give rise to tuberculous ulceration. In examining a small miliary tubercle of the liver, the tubercle cells were also seen to arise from the cells of the minute blood vessels, though I would, for the present, not positively assert, that the hepatic cells take no active part in the formation of the tubercle. The same appears to be the case in the kidneys, though in these organs I have, in some instances, met with glomreruli, the vessels and also the capsules which presented the appearance of having been transformed into a sort of connective tissue.

In studying the mode of the peripheral growth and extension of the tubercles in thin sections of tuberculous lung, it will be observed that it always takes place along the adjacent alveolar septa, which are thickened by the multiplication of

of smaller or larger tubercle cells arising from the connective tissue cells of the adventitia, or, perhaps also, from the cells of the endothelium of the vessels, ramifying in these septa. It is thus that in these sections the outlines of the tubercles, when examined under the microscope, appear but rarely as evenly curved lines, though to the naked eye the little round or oval tumors may present a smooth appearance. In most instances, the borders of the miliary tubercles are irregular, to a certain extent star-shaped, or multipolar, the processes being formed by the adjacent inter-alveolar septa, along which the growth of the tubercle proceeds. This is especially the case in those large tubercles and tuberculous masses, met with in those lungs affected with chronic tuberculosis, in which the mode of extension of the tubercular process may be studied to advantage.

After having in the preceding paragraphs endeavored to show that the tubercle cells are most probably derived from the connective tissue cells of the adventitia of the vessels, ramifying in the inter-alveolar septa of the lungs, I shall now pass over to a brief consideration of the general character and relations of all the cells met with in the anatomical composition of the miliary tubercle. Presuming, then, from what has been said above, that the true tubercle-cells are descendants of connective tissue cells, it still remains for us to determine the origin of the other kinds found in their company. In considering first the origin and signification of those small lymphoid cells, generally met with along the periphery of the tubercle, we may suggest that they represent true exudation cells, or, in other words, colorless blood corpuscles, emigrated from the neighboring congested blood-vessels; or, as they are not met with in the main body of the tubercle, they might also be regarded as young tubercle-cells, derived, like the others, from connective-tissue cells. In most instances, the neighboring

blood-vessels of the miliary tubercles are found congested, and, if this is not the case, it may safely be presumed that they were congested during, and even previous to the formation of the tubercles; for it can hardly be supposed that the tuberculous process would take place and continue without an increased activity of the minute blood-vessels, giving rise to a morbid irritation of the connective tissue cells of their adventitia. The abnormal activity of these vessels, however, would soon be followed by a relaxation of their walls, causing a retardation of the blood-current within them, which would finally lead to a permanent congestion of these vessels. Under these circumstances it is not improbable that a number of colorless blood corpuscles emigrate from the blood-vessels, and in association with the tubercle cells—which at the same time are formed from the irritated and now multiplying connective tissue cells of the adventitia—take their part in the formation of the tubercle. It is thus that these lymphoid cells are always met with at the periphery of the tubercle, or in the alveolar septa.

The next kind of cells to be considered are the so-called "giant cells" which, greatly differing among themselves in their diameter, and individually containing a smaller or larger number of nuclei, are principally met with in the older and larger tubercles. Although surrounded by the general mass of tubercle cells they remain unconnected with the latter. In thin sections of tubercles, they appear finely granular, mostly round or oval, though sometimes irregular in form; they are surrounded by an empty space which separates them from the regular tubercle cells, though, in some instances, they appear connected to the latter by processes arising from their body. Although these giant-cells have frequently been the subject of special study, pathological

anatomists still differ in their views as to the origin, nature and signification of these formations. By some they have been regarded as representing coagula within the bloodvessels, around which the tubercle is developed, their nuclei being partly derived from the colorless blood corpuscles of the coagulum, partly from the endothelial cells of the vessels; or, also, the whole giant cell representing a conglomeration of colorless blood-corpuscles;—while on the other hand they have been looked upon as conglomerations of epithelioid tubercle cells, or of epithelial alveolar cells. Again, according to another view, they are derived from the connective tissue cells, or also, from the endothelial cells of the lymph-spaces. When met with in tubercles of the testicle, liver, kidney, and mammary gland, they have been regarded as derived from the epithelia of the seminiferous tubules, hepatic ducts, uriniferous tubules, and milk ducts. Without enlarging upon the various theories existing on the origin of these giant cells, we may say, that they are generally considered to represent smaller or larger masses of protoplasm, derived either from the growth of one cell, the nucleus of which alone was subjected to the process of multiplication, or from a fusion of the protoplasm of a number of cells with single nuclei. From my own observations it appears to me that perhaps the greatest number of these giant cells are formed from coagula of blood within the blood-vessels. I have been convinced of this by observing, especially in thin sections of fibrous tubercles, a number of these cells or masses of protoplasm still to consist of a mass of brownish polygonal cells, lying loosely in, or even connected by some points of their periphery with the wall of empty spaces, representing most probably the lumina of blood-vessels. The walls of the lat-

ter, though fused with the surrounding tubercle, and, like this, consisting of long, spindle-formed cells, could be still distinguished. Whether the polygonal cells, generally surrounded by a brownish, finely granular, substance, were derived from the colorless blood-corpuscles of the coagula, or from the cells of the endothelia of the vessels, I leave for the present undecided. Generally, there were no colored blood-corpuscles observed in the mass, a circumstance, which is, however, easily explained by assuming that the protoplasm of these corpuscles had been appropriated by the other cells to serve them as nourishment during their growth, while the hæmoglobin of the former was left behind. The degeneration of the protoplasm of the giant cell thus formed, which, of course, eventually takes place, causes the obliteration of the outlines of its component cells, so that the whole formation assumes a finely granular brownish appearance. A number of giant cells presenting this appearance and containing a smaller or greater number of nuclei are, therefore, always met with in the tubercles of the same section of lung. But though, as I have said above, the greater number of giant cells may be formed in the manner just stated, I have good reasons to believe that others represent conglomerations of cells of the alveolar epithelium, which, during the growth of the tubercle, were surrounded by the multiplying cells of the latter. To this view I was chiefly led by meeting in a number of alveoli with certain conglomererations of cells, which, presenting the average size of a giant cell, resembled those cells lining the wall of the alveolus, to which they appeared to be attached. These giant cells do not present a brownish appearance, but absorb coloring matter more intensely than the surrounding tubercle cells. I have

never observed giant cells converted, like the true tubercle cells, into any form of connective tissue.

Besides the giant cells there is another kind of cells met with in the miliary tubercle, the origin of which we shall now consider. I refer to those peculiar cells, which are characterized by their brownish or blackish appearance, and by the fat globules and fat crystals they contain; they are, as before mentioned, met with in sections of older tubercles, especially when treated with a solution of caustic potassa. These cells are generally single, and mostly met with along the periphery of the tubercle. They always contain a considerable number of smaller and larger fat globules, and many of them fat crystals, and black pigment granules besides; the latter, in fact, causes their brownish or blackish appearance. By these characters they are easily distinguished from true tubercle cells; for, though many of the latter also undergo fatty degeneration, they do not contain so great a number of large fat globules as the former, nor do they contain fat crystals, or pigment granules. I doubt not but that these cells are identical with the epithelial cells lining the alveolar cavities which, during the growth of the tubercle, are surrounded by, and inclosed in the mass of growing tubercle cells, to finally undergo the fatty metamorphosis, whilst in the older tubercles the fat globules will be converted into fat crystals, or, even, into black pigment. Not unfrequently these cells are also met with in the expectoration of chronic cases of tuberculosis.

There is another anatomical element met with in many, though not in all tubercles, which like the giant-cells has frequently been a subject of discussion, or even of controversy, among different investigators. This is the so-called "reticu-

lum." As far as my own observations extend, I may state that such a reticulum, which by some authors has been compared to the stroma of some pathological tumors, appears to exist in many miliary tubercles, especially in the older ones, whilst in others it is certainly absent. For the reason, however, that I entertain some special views on the origin of this reticulum, which to explain would consume too much space in this treatise, I must for the present forbear to enlarge upon this subject and postpone its discussion to some other occasion.

In the great majority of cases of tuberculosis, the miliary tubercles or tuberculous masses undergo a certain kind of degeneration, known as "coagulation necrosis" which lead to their final destruction. Not unfrequently, however, the cells of the miliary tubercle, instead of undergoing this retrograde metamorphosis, show an inclination to become organized into a higher grade of tissue, by gradually assuming a more and more elongated form, in order to be finally converted into a sort of connective, or so-called "cicatricial tissue." This process may be observed in all its various stages in those indurated portions of lung met with in cases of chronic tuberculosis, where it involves not only the tubercle cells, but also those of the interstitial connective tissue of the organ as well as of the blood-vessels, etc. The tendency of the tubercle-cells toward organization is, moreover, and perhaps more distinctly, displayed in those cases of so-called "fibrous tubercle," the lungs of five of which I have microscopically investigated Here, the tubercles, though miliary in character and mostly small in size, are frequently found lying very near to one another, forming smaller and larger groups or masses. Sometimes even, they fuse with another, though it can always be seen that each tubercle had developed from its own individual center. These tubercular groups, or masses, I mostly found

in the apices of the lungs; only in some instances I observed them, as also single fibrous tubercles, in the other lobes of these organs. In all cases of fibrous miliary tuberculosis that came under my notice, the tubercles were not what might be called "numerous" as we often observe in acute miliary tuberculosis, but they were almost always associated with a greater or less peri-bronchitis fibrosa, or with interstitial pneumonia (cirrhosis of the lungs), and generally characterized by an abundant formation of black pigment.

It is not often, however, that the tubercular process in the lungs is arrested by a fibrous metamorposis of the tubercle cells; on the contrary, in the great majority of cases of tuberculosis, so already mentioned, the disease is carried to a fatal issue by a retrograde metamorphosis, the so-called "cheesy degeneration," or "coagulation necrosis," which the elements of the tubercular growth gradually undergo. By this process, which always commences in the center of the tubercle, and progresses toward its periphery, the protoplasm of the tubercle-cells appears to coagulate and to be converted into a cheesy substance, by the final disintegration and liquefaction of which a cavity is formed in the center of the tubercle. In the course of the degenerative process the outlines of these cells become obliterated, and their protoplasm is gradually converted into a cheesy granular mass, containing minute shapeless bodies or particles. These bodies, I suppose, represent to a certain extent the remains of the nuclei of the tubercle cells, which appear to possess a greater power of resistance to the pathological cause of the process than the protoplasm of the cells. The direct cause of the coagulation-necrosis of the miliary tubercle has, as yet, not been positively determined, though the degeneration is commonly ascribed to a want of nutrition due to the absence of blood-vessels in the tubercle. In exam-

ining thin sections of tuberculous tissues we already observe traces of the degenerative process in almost all tubercles; it is only the smaller ones, or those most recently formed, that are still free from degeneration. In the older and larger tubercles, small cavities, formed by the final disintegration of the cheesy mass, are observed in their center, whilst at the periphery the tubercular growth is still going on. In those large tubercles, formed by the meeting and fusion of a number of smaller ones, several centers of degeneration and disintegration may exist at the same time. By the breaking down of these tubercles a number of small cavities are formed throughout the tuberculous portion of the lung, which, in the course of the disease, may enlarge by the ulceration and final destruction of the intervening non-tuberculous parenchyma. Such a condition is mostly observed in miliary tuberculosis. In some cases of chronic tuberculosis, however, smaller or larger circumscribed cheesy masses, surrounded by healthy parenchyma, are frequently met with, in which only one cavity, produced by the breaking down of their substance is found to exist. From this circumstance it appears that in these masses, some of which are more or less spherical in form, the tubercular process started from only one center, and after having proceeded in a radiating direction to a certain extent, was by one or the other cause arrested. These formations represent, in truth, miliary tubercles on a large scale. They are, generally, partially detached, partially still connected with the surrounding healthy parenchyma. Several years ago, I have hardened quite a number of these circumscribed cheesy masses, or nodules, some of which as large as a walnut (about one and a quarter inch in diameter), in Mueller's fluid, followed by alcohol, with the view of investigating their exact nature in thin sections. The microscopical examination of these sections showed me

that, while at the borders of the cavities the substance of these giant tubercles was, as in the ordinary miliary tubercles, completely degenerated and disintegrating, their former structure could be still distinguished throughout the greater part of the section. Not only the outlines of the numerous alveoli, bronchioles, interstitial connective tissue, etc., which had been involved by the growth, but also, toward the periphery of the latter, those of the tubercle cells could still be recognized. The borders of these circumscribed masses were formed by long structureless bands, concentrically arranged around their periphery and connected with the surrounding non-tuberculous parenchyma. No traces of the outlines of elongated cells, indicating their formation from tubercle-cells, could be discovered in these bands; but though of a smooth homogeneous aspect, they rather appeared to have at one time represented bundles of neoplastic connective tissue, the product of some inflammatory process. A closer study of the subject subsequently showed me that they represented the former walls of the adjacent alveoli of the surrounding non-tuberculous parenchyma, which, being put on the stretch by the increasing dimensions of the tuberculous growth, had adapted themselves to the peripheral form of the latter, and, through the inflammatory irritation extending from the neighboring tuberculous mass to their blood-vessels, were eventually converted into bundles of a coarse neoplastic connective tissue. That this was the true explanation of the phenomenon observed, was proved by the surrounding alveolar walls of the healthy parenchyma, which, still connected to these fibrous bands, presented in the section the form of more or less elongated meshes, produced by the stretching of the lung parenchyma.

The conversion of the alveolar walls into neoplastic connective tissue, however, is not only observed around the periphery of the

above described tuberculous masses, but takes place also in other localities of tuberculous lungs, for instance, along the borders of those portions of indurated lung, met with in chronic tuberculosis. Even, along the periphery of miliary tubercles, sections of the alveolar walls of the surrounding parenchyma are frequently observed to present the form of elongated meshes. A similar aspect is presented to the eye of the observer in the microscopical examination of sections made from lungs affected with peribronchitis fibrosa. Here sections of obstructed bronchial tubes will be met with in which the original structure of their walls is entirely obliterated, and the whole tubule appears to be converted into connective tissue; the cavity seen in the center of the tubule represents the disintegrating fibrinous thrombus. The sections of such bronchioles somewhat resemble those of miliary tubercles, though a closer examination will show no trace of a tubercle cell, but rather that they consist of concentrically arranged homogeneous looking bands, some of which are still connected with the elongated alveolar walls of the neighboring parenchyma of the lungs.

Although the formation of these fibrous bands along the borders of tubercles, otherwise tuberculous portions of lungs, might be regarded as a means of nature to arrest the morbid process of tuberculosis, this is rarely the case. On the contrary, the homogenous structureless appearance of this neoplastic connective tissue already shows that it will be, like the tuberculous portions of lung which it borders, finally subjected to the coagulation necrosis. The elongated spindle shaped tubercle-cells, playing a prominent part in the process of induration of certain portions of tuberculous lung, either such as they are, or transformed into a coarse connective tissue, are in most instances likewise doomed to undergo the same destructive process. It is this that in cases of chronic tuberculosis

very considerable portions of lung are frequently destroyed and large cavities formed. The only organs, capable of resisting this general destruction, are the larger blood vessels and bronchial tubes, which are frequently met with stretched across these cavities in the form of single cords. Like the ordinary miliary tubercle, the fibrous tubercle, also, is subject to undergo, at least in its center, the coagulation necrosis.

From the above sketch of the origin, development, retrogression and death of the miliary tubercle in its various forms, it will be seen that the tubercular process is very complicated, and that it closely resembles in its products and their metamorphoses the process of chronic inflammation. To convince ourselves of the truth of this assertion we have but to examine and study the condition of the lungs of a case of chronic tuberculosis. In such lungs all the various stages of the inflammatory process will be found represented in different localities of these organs. Thus we may find the superior lobe hollowed by smaller or larger cavities, which, frequently communicating with one another, are like a chronic abscess lined by a so-called pyo-genetic membrane, and contain a greater or lesser quantity of purulent matter. The remaining parenchyma of the lung between these cavities is generally found indurated, and, when miscroscopically examined, presents to the eye of the observer a most variegated picture of its anatomical elements passing through the various stages of the inflammatory process. Approaching in our examination the base of one or the other lung we may find, according to the prevailing circumstances of the case, a decrease of the inflammatory destruction in the absence of the cavities, whilst the parenchyma, though still congested and containing large tubercles or tubercular masses, appears more soft and spongy than in the upper portion of the lung; or, at the very base of

the organ, the parenchyma may even present the appearance of a typical miliary tuberculosis. In accordance with the special conditions of the different parts of such a lung; its surface also presents a variety of colors and their shades, for, whilst one portion of it may appear more or less gray by the induration of its parenchyma or the thickening of the pleura, another portion may by the congestion of its vessels present a red or blue appearance, while a third will exhibit all the macroscopical characters of emphysema. Thus it happens that, in severe cases of chronic tuberculosis, a combination of otherwise individual inflammatory diseases of these organs, such as bronchitis, peribronchitis, bronchiectasis, interstitial pneumonia, etc., may be found to exist at one and the same time.

With the foregoing paragraph I close the general remarks on the pathological anatomy of tuberculosis, to which I referred in the beginning of this division of the present treatise. The sketch which I have drawn of the origin, development and death of the tubercle of tuberculosis is, though it may serve my present purpose, far from being complete. But as the reader may infer, from what I have already said above, the subject of tuberculosis is too complicated and extensive for a thorough discussion in all its details in the limited space of my present treatise, requiring rather the numerous pages of a whole volume. Whatever, therefore remains to be said on the pathology of tuberculosis I will have to postpone to a more convenient occasion.

PARALYSIS AGITANS. *By* EDWARD C. MANN, M.D., *Superintendent Sunnyside Home for Nervous Invalids.*

Paralysis agitans is a disease characterized by involuntary tremors or shaking movements of the limbs, head or trunk of the body, of a spasmodic nature, by diminished muscular power or paresis, and in an advanced stage of the disease by a disturbance of equilibrium, shown by a tendency to stoop forward, and an accelerated walk. The tremors constitute the most distinctive features of the disease. In the first stage of the disease the tremors and paresis affect either the arm and hand or perhaps the leg or the head. Secondarily, the tremors become generalized and finally affect the whole body. The disease is very insidious and progressive and the tremors tend, as the disease advances, toward convulsive activity. Sleep relieves the patient, as then there is a cessation of the convulsive tremors. The forward stoop is caused by paresis of the extensor muscles of the back and the muscles become rigid and contracted as do also the muscles of the extremities. There is a verbal paralysis to some extent. If the disease progresses to a fatal termination the patient wakes up greatly frightened in the night by the convulsive agitation appearing even then, and the poor sufferer is finally completely exhausted. The cutaneous sensibility is not affected in paralysis agitans, neither as a rule are the special senses, nor the integrity of the intellect. The disease comes on in advanced life generally. All writers upon diseases of the nervous system concur in the statement that, with a few rare exceptions, it is incurable.

Dr. J. Russell Reynolds, of England, has reported one

very interesting case of cure by the continuous or galvanic current, and Remak has also reported one. The diagnosis is easy, as in other tremors the trembling does not occur when the parts are not in use and are supported. The non-senile form may occur in early life, but there is no fatal tendency and the tremors disappear, except when voluntary movements are attempted, and there is no disturbed equilibrium or forward stoop. Hysterical paralysis agitans is accompanied by other hysterical symptoms. Intermittent paralysis agitans in the young is removed by anthelmintics, as it generally depends on intestinal worms. Chorea is a widely different disease, and is not liable to be confounded with paralysis agitans. The lesion in the fatal cases would seem to consist progressively of irritation, congestion and, finally, sclerosis and atrophy of the motor nerve centers, while in the cases on record that have recovered the trouble was probably functional, and had not progressed beyond the stage of impaired nutrition, irritation and congestion of the motor nerve centers. It is stated that an atrophic condition of the spinal cord, pons varolii, crura or medulla oblongata has been found in several careful dissections of those in whom the disease has proved fatal, and also sclerosis and patches of gray degeneration. It is possible that in some cases *multiple sclerosis* may be mistaken for paralysis agitans. The former disease, however, rarely occurs after thirty years of age and generally between twenty and twenty-five years, and is more common in women than in men, while the latter disease generally attacks the male sex more frequently. The earliest symptoms of multiple sclerosis is rhythmical tremors, but this trembling generally disappears as paralysis supervenes. The eyes are involved, the vision being indistinct

and double vision occurring. The speech is slow and drawling; vertigo is a marked symptom; paresis of the lower limbs, terminating in true motor paralysis, is a marked symptom. There is contraction of the limbs; the general expression changes and the mind becomes weakened, and finally death occurs from failure of the nutritive function. It will be seen that, aside from the tremblings of head, neck, trunk and limbs, which come on *only when the muscles are being exerted*, in disseminated sclerosis, the two diseases have no feature in common. The following case, interesting by reason of the rarity of recoveries, occurred in the person of a Mrs. E., aged 50, resident of New York city and the superintendent of one of our charitable institutions, and it serves to illustrate these cases very well. The disorder had come on gradually, as the result of domestic unhappiness and grief, and had finally culminated in a condition of sub-acute mania, complicating the case very seriously. At first I declined to take such a case, and gave the ladies who were interested in the patient a very unfavorable prognosis concerning it. I finally agreed to treat her for one month, her friends agreeing to remove the patient at the expiration of that time if I could effect no improvement, which I certainly did not expect to be able to do. At the time of her admission the trembling was incessant and involved all the limbs. There were delusions of suspicion and dread and fear of persecution—in other words, marked mental disorder. There were hallucinations of sight and hearing. There would be exacerbations of the tremblings, due to emotional disturbance. There was marked muscular rigidity and contraction, so that the head was thrown forward and fixed, and the trunk was also bent forward.

Walking seemed very difficult and also talking. The muscular force and the cutaneous sensibility were normal, so far as I could ascertain. There was marked tremulousness of the tongue when protruded. The trembling at first attacked one hand and arm, and gradually spread all over the body. I regarded my patient as hopelessly incurable. I however directed warm baths with cold affusions to the head at night, opened the bowels freely with a mercurial cathartic followed by salines, and then put my patient practically on a milk diet and secluded her from all society save that of her nurse, and directed the latter to administer three times a day drachm doses of sodium bromide and tincture of hyoscyamine, and I soon found to my surprise that my patient was improving very much. Electricity in the form of central galvanization and also a bi-temporal current were employed. The mental excitement soon began to disappear, the muscular trembling gradually subsided very much in proportion as the mind became quiet, and at the end of one month I saw that my patient was rapidly improving, contrary to all my expectations. I accordingly allowed her to take moderate exercise in the open air and put her on a full diet. The rigidity and contraction of the muscles disappeared gradually, the gait becoming assured, the head coming up erect and also the trunk. The speech lost its tremulousness and the face assumed a much more bright and intelligent expression. At the end of the second month all mental disturbance had passed away, the mental faculties remaining normal. I now discontinued the use of the sodium and hyoscyamine and also the central galvanization, substituting instead the induced current in the form of general Faradization, using it as a nervous stimulant and

tonic. I considered that by the constant current I had removed the nutritive defect in the central nervous system, improving the tone and nutrition, not alone of the brain and cord, but also of all the deeper tissues of the body. A tonic mixture containing quinine, phosphorous and strychina was now ordered and the patient's weight increased markedly during the third month of her treatment. At the expiration of the third month she was discharged perfectly well, not a trace of trembling being visible in muscular action, speech or gait. The mental faculties were pefectly restored. The patient, against my advice, returned to her laborious post of duty and has since remained perfectly well. I do not know that I should in another case get such a favorable result. I am afraid not, but should certainly work with more expectation of such result than I have previously entertained. My success in this case, however, warrants me in expressing the hope that such cases may have the benefit of long-continued applications of electricity, with bromide of sodium in drachm doses in half a tumbler of water thrice daily, between meals, and either the fluid extract of hyoscyamine, the tincture or hypodermic injections of $\frac{1}{60}$ gr. of the crystallized extract of hyoscyamine. Prof. Charcot considers it probable that the morbid anatomy of many of the cases that go on to a fatal termination, consists of obliteration of the central canal of the cord by increase of its epithelial lining, overgrowth of the nuclei which surround the ependyma and marked pigmentation of the nerve cells, principally those of Clarke's posterior vesicular columns. In my case, if the paralysis agitans had depended upon an atrophic condition of the spinal cord, pons varolii, crura or medulla oblongata, or, in other words, had

depended on organic changes, I do not think a cure could have been obtained. On the other hand, I am inclined to think that if there was degeneration, due to the new formation of connective tissue compressing the cord and nerve structures, the constant current, *perhaps*, by its catalytic effect could have had the power to remove such new formation, freeing the compressed nerve structure. My case, moreover, may have depended on congestion of the nervous substance or the membranes of the upper part of the medulla spinalis, oblongata and pons, which had not gone on to sclerotic atrophy and the galvanic current unquestionably would have relieved that condition permanently. I not only had to combat disease of the motor centers but also of the intellectual centers. The disease, I presume, commenced in the motor tract of the cerebrum, since the arm was first affected, and soon the corresponding one. I considered my case, however, probably to have been one in which there was congestion, weakness and irritability and instability of the molecular nerve structure of the nerve centers, owing, perhaps, to mal-nutrition, and that the disease was functional in character rather than organic. If so, then we may say that there are curable functional cases of paralysis agitans. My patient had not a rheumatic diathesis or any other morbid diathesis which could have disposed her to the disease. The case was to me exceedingly interesting.

Dr. J. Russell Reynolds reported in the London *Lancet* of Dec. 3d, 1859, a case of paralysis agitans cured by the constant or galvanic current. The patient was a married man and father of twelve children, aged 57, carpenter by trade. For the five years previous to Dr. Reynolds seeing him, he had suffered much anxiety respecting his children, although

Dr. Reynolds did not feel certain that that was the cause of the paralysis agitans. Occasional tremor of the right arm and leg appeared first about two years previous to treatment, and seemed to be increased by anything requiring expenditure of nervous power. These symptoms had much increased just before treatment was commenced by Dr. Reynolds. The arm was worse than the leg, and in it the motion most constant and most extensive was that at the shoulder joint. The involuntary movement of the arm could be arrested by the patient lying on the sofa and pressing the forearm against the ilium; but any attempt to move the limb voluntarily at once reproduced the shaking, although the patient remained in the recumbent position. The movement was instantly arrested when the doctor firmly grasped either the forearm in any part of its upper two-thirds, or the arm in its lower third. This did not seem to be a mere mechanical arrest of the movement, for it could not be effected by holding the wrist; and the jerking recommenced if, while the extremity was grasped in the manner described, the patient made any attempt at a voluntary movement. The mental condition of the patient and his general health appeared unaffected. The sensibility was unchanged in the right upper extremity, there was no deviation of the tongue nor distortion of the features. The patient could walk well, and without dragging either leg. A continuous galvanic current was applied to the arm and forearm, the movements of the latter being at the time arrested by pressure. At the end of five minutes he could execute voluntary movements without the least tremor, and emotional excitement failed to reproduce the jerking. The temperature of the two arms, examined after the current had been

passing for half an hour, was equal. The involuntary movements did not return until three hours after the current was discontinued, they then reappeared and continued throughout the evening; stopped at night, but returned on the following morning.

"Oct. 6. The current was applied while the arm was in violent movement, but in two minutes it became perfectly still: application continued for one hour.

"Oct. 7. Last evening there was no jerking nor tremor for five hours after the current was discontinued; then it commenced, but stopped spontaneously in about half an hour, and during the remainder of the evening there was nothing more than very trifling tremor. The jerking has returned this morning, but it is much less than on the first day of observation. There were but 20 alternations in fifteen seconds, and the range of movement is from three to four inches. The movement, therefore, is only 86 feet per second—less than one-eighth of what it was three days ago. The current was applied on the 7th, on the 8th and 10th, and after the 10th—*i. e.*, after five applications—the spontaneous jactitation completely ceased. When any weight is held in the hand and it is lifted towards the mouth, there is tremor, but this is slight, is not more than has occurred for the last two years, and it immediately ceases when the effort is discontinued. The arm and hand are weak; every movement can be executed by them voluntarily, but such movements are feeble.

"28th. Has written me a letter in a good and legible hand. The current was applied about every other day for an hour until Nov. 10th, and during this time there was

steady increase in the power of the limb and the jactitation did not return. No medicine of any kind was given.

"Nov. 12th, quinine and gin was ordered.

"15th. W. F. is in perfect health; there is no jactitation and only the slight tremor already described, when the hand with something in it is raised toward the mouth. The current employed in this case was from Pulvermacher's chain battery of 120 links."

34 West 33d street, N. Y.

A CASE OF LYMPHADENOMA. *By* J. W. NELSON, M.S., M.D., *Winnetka, Illinois.*

The disease commonly known as Hodgkins' disease, also known as lymphadenoma, pseudo-leueocythæmia, etc., although a comparatively rare disease and not often met with by the general practitioner, yet occurs with sufficient frequency to merit careful study, inasmuch as its etiology is so little known, its treatment uniformly ineffective and its results inevitably fatal.

Up to the present time those who have studied the disease have been unable to go beyond a certain point, nor will the cause of lymphadenoma, in all probability, ever be discovered until the origin of the red and white blood corpuscles has been found, and also the relation between the two established.

The object of this paper, however, is not a discussion of the various theories concerning the cause of lymphadenoma, but simply to record the history of a case now under the care of the writer, and to draw conclusions from it. However, a short review of the disease and its treatment may not be out of place.

Lymphadenoma manifests itself chiefly in the lymphatic system. There is an enlargement of the lymphatic glands by a deposit of adenoid tissue, also a deposit of the same kind along the course of the lymphatics and often in regions where there are no glands, but simply minute lymph channels. These enlargements vary in size and density, the more newly formed being less dense than than those of older growth. They vary in size from that of a pea to a hen's egg and even larger, a few have been recorded weighing two or three pounds. The posterior glands are usually the first affected, though not invariably, the affection spreading next to the other glands of the neck, then to the axilla, mediastium mesentery and inguinal region.

In some cases the enlargement is confined to only one or two groups of glands, but the tendency is to involve the whole lymphatic system. Apart from the phenomena exhibited in the lymphatic system, the most interesting features of the disease are to be seen in an examination of the blood. Excessive anæmia is always present in lymphadenoma. But more will be said with regard to the conditions of the blood further on.

In this disease, as in other stubborn affections, the whole pharmacopœia has been searched for remedies with little or no success. Nearly every drug classed as an alterative has been used, the best results being obtained from the use of mercury, iodine, iron, phosphorus and arsenic in their various forms. Of all these, the best results are claimed from the use of arsenic in the form of the liquor potassii arsenitis in large doses.

Extirpation of the enlarged glands has been resorted to with but little benefit, the glands in other localities invariably enlarging.

The following case came under my care Sept. 16, 1885:*

Mary C.; child, 6 years old; lives with her parents at — W. 22d street, Chicago. Locality in close proximity to south branch of Chicago river, low quarter of the city and badly drained. Parents, Irish. Father, day laborer, very intemperate in habits. Mother apparently healthy. No history of scrofula, tuberculosis, syphilis or lymphadenoma in the family. Found the child markedly anæmic, poorly nourished, and with hard tumors in the lymphatic glands and in the course of the lymph channels of the right side of the head and face. The cervical and submaxillary glands of the right side especially large and hard. Right eye closed by hardening and thickening of both lids. Especial thickening over the supercilliary ridges and in line of the temporal artery. Counted forty distinct enlarged glands, beside deposits elsewhere, the tumors ranging in size from that of a pea to a small hen's egg, the largest being in the right submaxillary region. On palpation could find no enlargement of spleen or liver. Percussion gave dullness in the median line over the thorax. Auscultation gave heart sounds normal, but rapid; mucous râles over the larger bronchi. From the constant cough, and dullness over the median line of the thorax, concluded that the mediastinal or bronchial glands were involved. Temperature, 103°; pulse, 168; respiration, 28. Rapidity of pulse due to excitement. Skin dry and scaly and covered with small sudaminous vesicles. To reduce the temperature, gave

R.—Potassii nitratis..... 6 c.c.
Spts. ætheris nit..... 16 "
Liq. ammoni acetat..... 16 "
Aquæ, q. s. ad.....128 "
M. f℥ss. every two hours.

*The first enlargement was noticed in May, 1885.

Sept. 17.—Child apparently better; could not take temperature on account of broken thermometer. Pulse, 140. Discontinued the above prescription and gave the following:

℞.—Liquor. potassii arsenitis.....f℥iv.
Syr. simp., q. s. ad.....f℥i.
M. f℥i twice a day.

Sept. 22.—Child apparently better, sitting up; no appreciable fever. Pulse, 126. Some of the glands seem slightly softened and reduced in size, especially those in axillæ and groins.

Sept. 24.—Child a little stupid. Temp., 98.8°; pulse, 130, runs up at the least excitement. Appetite good. Marked decrease in size of axillary glands. Increased the amount of Fowler's solution by giving three doses per day. Also gave the following:

℞.—Tinct. ferri chloridi.....f℥iii.
Syr. simp., q. s. ad.....f℥iv.
M. f℥i t. i. d. after meals.

Ordered the mother to give the child a thorough bath every day, to use massage over the enlarged glands and to lay the child naked for at least an hour in the day in the direct rays of the sun.

Sept. 26.—Pulse, 120; temp., 98°. Skin dry and still covered with small vesicles. Glands much reduced in size.

Sept. 28.—Pulse, 92; temp., 98.4°. Child bright, appetite good, still farther reduction in the size of the glands. Increased the dose of Fowler's solution to 10 drops three times a day.

* * * * * *

Oct. 3.—Pulse, 150; temp., 98.5°. Appetite good.

Glands smaller than when last seen. Fowler's solution beginning to show systemic effects. Discontinued it.

Oct. 5.—Pulse, 160; temp., 96.5°. Effects of the arsenic cease to show; gave :

℞—Acidi Phos. Dil..... .....f℥iv
Syr. Hypophos. Comp.....f℥ii
Syr. Simp., q. s. ad.....f℥iv
M. f℥i t. i. d. before meals.

Oct. 8.—Pulse, 144; temp., 98.5°. Tongue clean. Glands at a stand-still. Renewed Fowler's solution—10 drop doses t. i. d.

Oct. 12.—Pulse, 152; temp., 98°. Bowels quite loose. Discontinued the arsenic; renewed the phosphoric acid mixture and gave Emulsion I of Dispensary Formula.

Oct. 17.—Pulse, 132; temp., 98.5°. Renewed the arsenic. Glands decreasing slightly.

Oct. 20.—Pulse, 135; temp., 98.5°. Glands in axillæ and groins reduced almost to natural size. In left groin one gland still about the size of a chestnut, also one of the same size in the right axilla. Patient able to see out of the right eye that was formerly closed. Glands in submaxillary region still remain hard.

Oct. 23. On examining child's mouth found three badly decayed teeth, and thinking they might be a source of irritation ordered them extracted.

Oct 26.—Mother took the child to a dentist and had two teeth in the left lower jaw extracted. Child again beginning to show symptoms of arsenic poisoning. Discontinued Fowler's solution and renewed the phosphoric acid, etc.

Nov. 1.—Found the glands rapidly increasing in size;

glands in left submaxillary region near where the teeth were extracted much enlarged. Eyelids of left eye becoming thickened. Renewed Fowler's solution.

Nov. 5.—Glands increasing with great rapidity in spite of the arsenic. Discontinued it and gave compound syrup of the hypophosphites.

Nov. 12. Glands as large as before treatment. Left eye half closed; glands beginning to press upon the trachea. Sternum beginning to be pressed forward by enlargement of either mediastinal or bronchial glands. Breathing growing croupy. Child breathes more easily with head thrown back.

* * * * * *

Dec. 2.—Pulse, 150; temp., 98.5°. Breathes entirely through the mouth. Glands enormously swollen. All the tissues of the face thickened and hardened. Breathing croupy and labored. Tonsils somewhat enlarged. Right eye completely closed and left eye nearly so. Skin almost transparent in some parts and scaly in others.

Anæmia profound; child wasting in flesh. Very hyperæsthetic and cannot bear to be handled. Appetite fair. Hearing somewhat affected.

* * * * * *

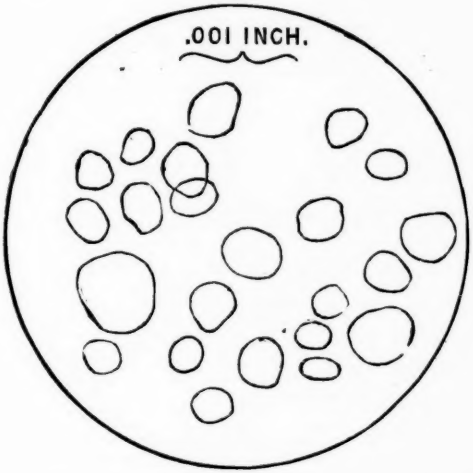
Dec. 9.—Pulse, 120; temp., 98.5°. Glands still enlarging. Examined urine and found it normal.

* * * * * *

Dec. 22.—Took child to South Side Dispensary. Dr. Lester Curtis examined the blood microscopically; found it pale and watery; coagulates rapidly. Relative quantity of red blood corpuscles greatly diminished. Slight increase,

if any, white corpuscles. Red corpuscles very irregular in size, many of them not more than one third or one fourth natural size; the white corpuscles appear like a mushroom in shape and covered on the surface with coarse granules which after two or three hours leave the corpuscle and are found floating in the plasma.

The following is a representation of a field of the red corpuscles drawn to scale.

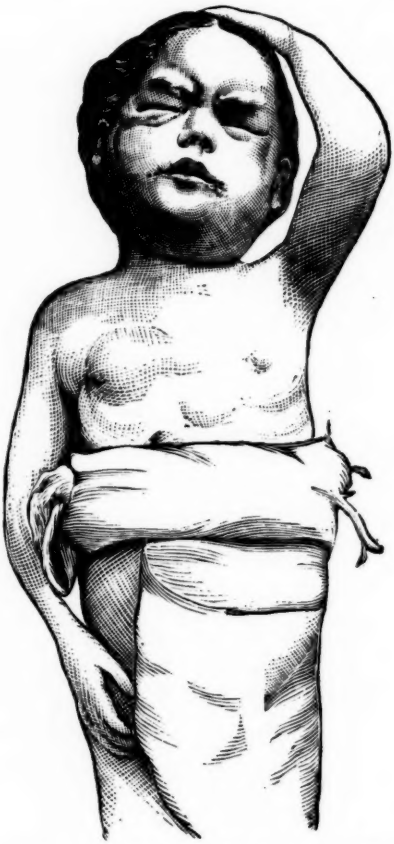


The picture at the right shows a white corpuscle not drawn to scale, but showing its coarse, granular appearance, also its mushroom shape.

Jan. 4.—Pulse, 144; temp., 99.5°. Bowels very loose. Glands still enlarging. Left eye nearly closed. Sterum somewhat protruding.

Jan. 12.—Pulse, 108; temp., 99.5°. Increase in difficulty of breathing. Eyes closed. Hearing very dull. Appetite poor.

Jan. 25.—Took child to a gallery and obtained a photograph.



Child able to see a little out of left eye. Breathing difficult for the last two days.

From the foregoing data very little that is new can be deduced, unless it be the highly granular appearance of the white corpuscles and the great irregularity in size of the red.

With regard to the treatment, there is fair ground for belief that if a case of lymphadenoma could be diagnosticated in its incipient stage, a free use of arsenic as an alterative, and iron to relieve the anæmia, would result in a permanent cure.

EDITORIAL.

CHICAGO MEDICAL SOCIETY.

An excellent precedent in the conduct of debates before the CHICAGO MEDICAL SOCIETY has been recently established by the PRESIDENT.

Special invitations, requesting participation in debate, have been sent to the various members of the local profession, who are supposed to be most conversant with the topic under consideration. Irrelevant discussion is thus cut off to a very great extent, and the author of a carefully prepared paper secures the critical attention of a jury of his peers.

The interesting character of the transactions at the last regular meeting,—when Professor A. Reevès Jackson's paper on "The Intra-Uterine Stem in the Treatment of Flexions" was read,—was due largely to this welcome innovation.

THE MEDICO-LEGAL SOCIETY OF CHICAGO.

Attention was called in the May number of the JOURNAL to the efforts of Dr. A. Reeves Jackson, Dr. Edward J. Doering and others in the establishment of a "Physicians' Protective Association."

On the fifteenth of May, 1886, an organization was effected, the association being termed the "MEDICO-LEGAL SOCIETY OF CHICAGO."

The object of the SOCIETY, as specified in the Constitution, is:

"The investigation, study and advancement of the science of medical jurisprudence, the punishment of unprofessional and criminal practice by members of the medical and legal professions, the prevention of blackmailing, and the procuring of such legislation as may be necessary to secure the ends above enumerated."

"Regular meetings shall be held on the first Saturday in September, December, March and June, and ten members shall constitute a quorum."

Over one hundred names have already been enrolled upon the list of members, and the profession is keenly alive to the importance of the organization. The adoption of the title, "Medico-Legal Society," obviates at once many of the objections, urged with force, against a PHYSICIANS' PROTECTIVE ASSOCIATION.

CHICAGO AS A MEDICAL CENTER.

On the fifteenth of June, the first session of the POST GRADUATE MEDICAL SCHOOL OF CHICAGO will commence. The CHICAGO POLYCLINIC will begin its courses of instruction for practitioners of medicine early in July. The establishment of these two schools marks a significant advance in the importance of Chicago as a medical center.

The large amount of clinical and pathological material placed at the command of these institutions will enable the practitioner to pursue his studies with ease and profit.

SOCIETY REPORTS.

TRANSACTIONS OF THE CHICAGO GYNÆCOLOGICAL SOCIETY.

LXIV Meeting, Friday, March 19th, 1886.

I.—Presentation of Instruments and Pathological Specimens.

II.—Adjourned Discussion of Pelvic Cellulitis.

III.—MILLER. *Report of a Case of Epithelioma of the Uterus; Treated by Mercuric Nitrate; Result Six Years After Treatment.*

I.—THE PRESENTATION OF INSTRUMENTS AND PATHOLOGICAL SPECIMENS.

PROFESSOR W. W. JAGGARD wished to call attention to a new instrument and a pathological specimen, in order to remind the Fellows of the Society of the first regular order of business, and on account of the intrinsic interest the instrument and the specimen possessed.

1.—Professor Alex. J. Stone's Pelvic-outlet Forceps.

Professor Alex. J. Stone, of St. Paul, has designed a very valuable pelvic-outlet forceps.

The characters of the instrument are:

Length, 24 cm. (Spoons, 14 cm., handles, 10 cm.)

Fenestra, length, 12 cm., width, 3.5 cm.

Cephalic curve, 8 cm.

Weight, 210 grammes.

English lock.

The instrument is bent backwards on its long axis, so that the angle, at the junction of the spoons and handles, is about 160°. The object of the perineal bend is to maintain flexion of the head during its passage through the vulvar orifice.

PROFESSOR JAGGARD had recently employed Professor Stone's forceps in a case in which the head was arrested at the vulvar orifice, the result of uterine inertia caused by a large intra-mural fibroid. It was possible to apply the forceps in the left lateral position without the patient's knowledge. He thought the instrument possessed obvious advantages over Dr. Sawyer's excellent pelvic-outlet forceps.

2.—Puerperal Uterus and Adnexa.

The pathological specimen was the uterus and adnexa, removed from the body of a patient who died at the Cook County Hospital on the third day of the *puerperium*. Dr. H. H. Frothingham, one of the resident obstetricians, had kindly placed the material at the speaker's disposal. The patient, thirty years old, multipara, was admitted to the Hospital on the thirteenth of November, 1885, and gave a history of forceps delivery of a dead child, with perineal laceration, on the eleventh of November. Temperature, 103.4° F.; pulse, weak and rapid; respiration, shallow and frequent; tongue, dry and brown; pulmonary œdema; rigors; profound prostration.

Abdominal tenderness, tympanites, dullness in both flanks; two tumors, the size of a hen's egg, on either side of the vulvar orifice; *labia majora* apparently gangrenous; recent perineal laceration; foul odor from vagina; complete cessation of lochial secretions.

The patient died soon after admission to the Hospital.

Autopsy.—Both pleural cavities about half filled with sero-

purulent fluid and flakes of lymph; lungs œdematous; pericardium contained three ounces of fluid similar to that within the pleuræ; *endocardium apparently normal*; myocardium soft and friable; no metastatic abcesses could be found. Peritoneal cavity contained about one gallon of sero-purulent fluid, with flakes of lymph; intestines contracted, but no adhesions; liver enlarged, congested, giving evidence of extensive fatty degeneration; *spleen*, of *normal size;* kidneys, cortex giving evidence of fatty degeneration, pelves injected and intensely hyperæmic; peritoneum injected.

The uterus was of a size, corresponding to the third day of the *puerperium*. The ring of Bandl was plainly demonstrable. The endometrium exhibited the pseudo-membranous necrosis, clearly described by Birch-Hirschfeld and and other pathologists by the term *endometritis diphtheritica*.

The mucous membrane of the vagina showed similar diphtheritic changes. Pus oozed through both Fallopian tubes. The left ovary and tube were intensely injected. Puerperal ulcers were visible on either side of the vulvar orifice. The tumors on either side of the vulvar orifice proved to be caused by hæmorrhage into the perivaginal connective tissue, —pudendal hæmatomata. No examination for micro-organisms was made.

DR. JAGGARD thought the case was a typical example, both as regards the clinical course and anatomical findings, of that form of puerperal fever, described by Buhl in 1861, as *Puerperal Fever without Pyæmia*, (endocolpitis, endometritis, salpingitis, peritonitis—subsequently pleuritis and pericarditis.) The entire absence of splenic tumor was worthy of particular notice. Carl Braun has justly attached great significance to this sign,—even going so far as to call it path-

ognomonic. The apparently normal state of the endocardium was remarkable.

II.—ADJOURNED DISCUSSION OF PELVIC CELLULITIS.

PROFESSOR A. REEVES JACKSON stated that he understood from the notice received that he was expected to introduce the general subject of pelvic cellulitis. If anything should cause a sense of humiliation to come to us as medical men it was the impression which was forced upon us of how little accurate knowledge we had upon even the most ordinary topics when we attempted to study any medical subject in detail. In order to introduce the subject of pelvic cellulitis he should say at least something about its pathology, diagnosis and treatment. In regard to the first of these subjects, Professor Thorburn says that he inquired of several experienced anatomists whether they knew of the existence of cellular tissue in the broad ligaments, and they replied that they did not know of it except from current gynæcological literature; of course that was because they had not investigated the subject practically; we do know there is a substance called cellular tissue in the pelvis, that it exists in and between folds of the peritoneum forming the broad ligaments between the uterus and the bladder, and also posteriorly to the uterus. When we speak of cellulitis we mean an inflammation affecting this tissue and all that is connected with it; that is, its lymphatics, glands, blood-vessels and nerves. Some think the starting point is nearly if not always in the lymphatic glands, so that here in the outset we are met with this evidence of lack of certain knowledge. He thought it did not matter much to us as practitioners whether that layer called cellular tissue is af-

fected in one portion only or whether other structures are also involved. The diagnosis presents difficulties, as we all know. In the first place, we do not always know when the disease is present, and in every stage we feel doubt as to whether this disease or some other is present; sometimes even when it goes on to its later stages we have doubt. The first evidence of this disease consists in an effusion of serum which produces a hardness in the part and which becomes more and more marked as the disease progresses; this may be of longer or shorter duration; it may disappear by absorption; or it may not disappear at all, but go on until the effusion becomes pus, forming pelvic abscess. Pelvic cellulitis and pelvic peritonitis frequently exist together, and as it does not affect our treatment of the case in the early stages this fact does not make much difference to us as practitioners. Coming to the question of treatment, he had always felt a great deal of doubt as to the efficacy of the usual means employed—opium, digitalis, quinine, etc.; that is, as to whether they have any controlling influence upon the progress of the disease. From the very nature of the inflammatory process he scarcely thought these things do more than simply palliate the symptoms. Prolonged hot water douches are doubtless remedial, and may abort the disease. Latterly, interest has been more centered in the treatment of the condition when it has advanced to the stage of abscess. Heretofore the treatment has been notoriously unsatisfactory, so that cases have gone on for weeks, months and years, the woman being constantly subject to discharges of pus, and the remedial means have done little more than assist nature in the escape of the fluid. But during the last few years, since

attempts have been made to treat the disease radically by surgical means, there has been offered an additional and efficacious method of dealing at least with some of these cases. He alluded to laparotomy. The success that has been attained in this way should lead us to look upon it with favor. He thought, however, that where radical surgical means are resorted to there is danger of too frequently performing operations dangerous in themselves, to relieve a disease which perhaps would not end life, although rendering the patient an invalid during her lifetime. He believed the discussion would be profitable if it should largely take the course of considering this latest and most formidable measure of treatment. He had read the account of Prof. Fenger, giving an account in detail of three operations made by himself; two of the operations were followed by death, which was attributed to some other disease, co-existent perhaps with the abscess itself; the other was successful. You are familiar with Lawson Tait's treatment for these encysted collections of pus. His success is simply marvelous. In 1883 the *British Medical Journal* published an account of twenty-four cases in which he had been successful, and in a letter which Dr. Jackson had received from him recently he said that up to that time he had operated successfully on thirty-two cases.

This was all the introduction Professor Jackson had to offer, and it opened the whole subject. He was reminded that he had not stated whether he approved of abdominal section for this cause. He said he did, unhesitatingly, and thought there was as good reason for operating in inflammation of the pelvis as in any other disease which produces life-long invalidism, provided it were not curable by other means

Laparotomy offers a method which is perhaps applicable to a comparatively small number of cases, and yet here it is the only remedy, that is, in cases of long standing in which the abscess cavity cannot be otherwise reached for the purpose of drainage, and where the women is of such an age that makes it reasonable to suppose she will suffer for many years. He considered it a dangerous operation, and there had been errors in diagnosis. Mr. Tait is justified in his bold method of diagnosticating abdominal disease by laparotomy. He follows it up with removal of the disease. Where the diagnosis is fairly established he believed that laparotomy is a proper procedure as a last resort.

PROFESSOR W. H. BYFORD thought there was not much more to be said than had been said by Professor Jackson, who had given an admirable *résumé* of the subject in all its bearings in such a way as to set it before the Society with clearness, and he approved of all Professor Jackson had said, without exception. Professor Byford had already said to the Society what he had to say upon the subject of pelvic abscess, and what he thought of the conditions of the operation of laparotomy for the abscess. He could not get rid of the idea that the operations performed by Lawson Tait were cases in which the abscesses were largely in the abdominal cavity, and were not pelvic abscesses, properly speaking—certainly were not confined to the pelvis; and he believed from what he had seen in regard to his cases that almost all were encysted peritoneal, instead of encysted pelvic abscesses. In speaking upon the subject before, he had taken the stand that the operation of cutting into the peritoneal cavity for the purpose of going down into the pelvis when the abscess did not reach above the pelvic rim, was not justifiable in many instances, if

at all. Where there has been a bar thrown out by the effusion of lymph in the peritoneal cavity so as to isolate the purulent collection and it extends up into the abdominal cavity, then he had no doubt of the propriety of the supra-pubic operation. He had recently seen an abscess, which formed mainly above the pelvic brim, open into the rectum at the top of the pelvis, taking its course above and across the *fundus uteri* and opening in the side of the rectum. The collection of pus was entirely above the pelvis, and it was necessary to cut through the muscles and fascia to get into the pus cavity and then establish a process of drainage through the rectum. It would have been impossible in that case to have effected the opening through the vagina.

PROFESSOR J. H. ETHERIDGE said he had had no experience in opening the abdomen for treatment of abscess in the pelvis. He had seen one abscess opened through the abdominal wall, which had a spontaneous opening into the rectum. It was done at the Presbyterian Hospital about a year ago. The top of the abscess could be felt through the wall, and an attempt was made to find the opening, wash it out and inject it; but this being regarded as impracticable, abdominal section was decided upon, and a very curious combination of pathological conditions was discovered. The abdomen was opened, and a protruding something was discoverable; there was a discharge of perhaps an ounce and a half of serum, then it was cleaned. It was really a cystic growth, and upon introducing the finger another cyst, apparently, was discovered, that was opened and thoroughly evacuated, then another protruding by it was discovered, which was found to be the abscess cavity itself. That was opened and cleaned out and a drainage tube introduced and fastened to the wound, and the patient dressed, but she died within twenty-four hours. Post-mortem examination was

made, and the track of the opening readily marked out. He had seen pelvic abscesses that opened in all directions through the abdominal cavity, into the bladder, vagina, and rectum, but never saw one that opened into the uterus. He saw at the Woman's Hospital an abscess that opened through the vagina and abdominal wall. The patient died. Dr. Etheridge said he had under treatment a pelvic abscess that opens into the rectum, in which general cellulitis is present. About once in six weeks the woman would have a fever, and after undergoing a great deal of suffering, nights of pain in which she would have to take large quantities of opium, there would be a discharge of pus into the rectum. She was put on tonics, and her general health improved greatly. Now she goes a great many weeks at a time without any return of the symptoms. A slight discharge of pus is present with every discharge from the bowels. It seemed to him as if the true estimate to make of the justifiability of laparotomy for abscesses is the ability to reach the top of the abscess through the abdominal wall, and where it cannot be reached it seemed to him that purulent discharge of the abscess into the abdominal cavity would surely take place.

DR. EDWARD WARREN SAWYER thought it a matter of regret if the discussion were to conclude without the special indications being given for a line of treatment in given cases. For his own satisfaction, he would like to have an answer to the following questions: First, in case of pelvic abscess, in which there is already an opening established, either by the bowel or by the bladder, is laparotomy ever justifiable? Second, in a case of supposed pelvic suppuration, without any external manifestation, as an opening through the bowels or bladder, is laparotomy ever justifiable?

DR. A. H. FOSTER said he had not been present long

enough to learn the scope of the discussion, and had but little to add. He did not recollect any case of pelvic abscess in his experience, although it was that of constant care of cases of pelvic cellulitis, more or less extensive. He always expected to have a larger crop of such cases, of more or less gravity, at this time of the year than at any other, especially those cases that are non-puerperal, but are menstrual. The cause seemed to be carelessness in regard to clothing, especially of the feet, and the exposure which comes from the varying weather in this climate, hot and cold, wet and dry. In regard to treatment of these cases, his treatment did not differ from others. He always relied on prompt doses of mercury and opium until the acute symptoms subsided; fomentations externally and hot douches internally, and then followed either with the muriate of ammonium or the iodide of potassium, reducing the opiate as fast as possible and continuing quinine or its substitute.

DR. PHILIP ADOLPHUS said that in the absorption of recent inflammatory deposits in the pelvis, he depended on the action of the skin, kidneys and bowels, stimulated by proper medication. In regard to hot douches, it depended whether the surroundings of the patient are such that they can be given properly; if otherwise, to attempt it will result injuriously. If symptoms point to suppuration, and fluctuation can be felt *per vaginam*, the use of the hypodermic syringe will disclose serum or pus. If serum, he trusted to absorption; pus, however, necessitated a speedy incision, with subsequent drainage, etc. If formation of pus is suspected at any time, it is best to look for it, and if it cannot be found, it is best to wait for its pointing. However, if the patient is in great danger, laparotomy is indicated.

DR. F. E. WAXHAM was sorry that he had not been able to

hear the whole discussion. He was reminded, quite forcibly, of a laparotomy upon one of his own patients; however, it was not a case of pelvic cellulitis — it was acute peritonitis, with effusion within the abdominal cavity. This patient presented all the characteristic symptoms of peritonitis, intense abdominal pain, exceeding tenderness and great abdominal distension; the patient passed from bad to worse, and finally fluctuation was detected in the lower portion of the abdominal cavity. An eminent surgeon was called in consultation, who recommended laparotomy as the only hope of saving the patient's life. It was supposed there was pus within the abdomen, and, although very feeble and greatly exhausted, it was considered proper to give the patient the benefit of the operation. Frequent hypodermic injections of brandy were given, in order to support the flagging pulse during the operation. The abdomen was opened, but no pus was discovered in the abdominal cavity; a thin, serous fluid was discovered. The patient barely survived the operation, dying about six hours later from prostration and shock. In contrast to this patient, he remembered another—a case of peritonitis in a child—that had all the characteristic symptoms of acute, violent peritonitis. This patient was seen by Dr. W. H. Byford, who gave valuable assistance in the treatment. The child, who was but seven years old, was obliged to take twenty drops of tincture of opium every hour and a half for two days at a time, in order to control the intense pain, and it seemed as if it was impossible for it to live from one hour to another; fluctuation was found more marked in this case than in the other, but, notwithstanding all these unfavorable symptoms, this little patient made a gradual, slow, tedious, but yet permanent recovery. He believed we ought not to subject a person to so dangerous an operation as laparotomy without

proof of the presence of pus. It seemed to him that a serous fluid might become absorbed and the patient recover, where an operation would very likely cause death.

PROFESSOR CHARLES WARRINGTON EARLE said he had nothing new to add in regard to the ordinary general treatment of pelvic cellulitis or abscess, but he was practically interested in exactly the questions that had been asked by Dr. Sawyer. He spoke of the terrible cases which he supposed all physicians meet occasionally. He had probably seen half a dozen during his fifteen years of practice. These cases have a history of pelvic pain and inflammation, and finally a discharge of pus, which continues for weeks and months, and sometimes years. At last some of us are called in and find that the woman is suffering from chills, a high temperature, feeble pulse, and is greatly exhausted. He wanted the older members to tell what should be done with such cases. Is there any hope for a woman in this condition? A few months ago he was called in consultation with another physician to see a lady who had a constantly discharging abscess, until she was nearly dead from exhaustion. The question in his mind was,—and it was one he would like to have discussed,—will it do any good to open the abdomen of such a woman and clean out those pus pockets? Have we any experience which will give us a moderately safe rule by which to proceed in such a case, where death is absolutely certain if something out of the usual line is not done? He hoped some light would be thrown on this question.

DR. HENRY T. BYFORD thought that the treatment of the first stage had been spoken of too slightly. He had seen much irreparable harm done by the failure of physicians to promptly recognize and properly treat the acute attacks. There is no doubt of the positive influence of opium on the

peritoneal part of the inflammation, of sedatives on the arterial excitement, of absolute quiet of body (opium acts largely by quieting all motion in the bowels), and of the local application of heat. But he protested against the early indiscriminate use of the vaginal douche. He had known it to do decided harm.

He attributed the lack of hopefulness, in speaking of the management of suppurating cases, to the lingering influence of past experience. In the light of our present knowledge, the lines can be drawn much more definitely. A pelvic abscess should of course be opened wherever it may point, whether in the vagina, rectum, or under the skin. When the primary outlet is made though the skin, the treatment, being entirely antiseptic in character, leaves nothing to be desired; when made through the vagina or rectum, the outlet must be, as nearly as practicable, at the most dependent portion, for strict antisepsis being impossible, drainage should be perfect. Spontaneous primary openings through the cutaneous surface that do not admit of a thoroughly antiseptic management must be modified so as to admit of it; and openings through the vaginal or rectal walls, that do not secure adequate drainage, must be made to do so. The most troublesome of these abscesses are those that have formed an opening into the bladder or alimentary tube beyond reach, and do not completely empty themselves through it. When such is the condition, rather than cut through solid tissue by the vagina or rectum, we must, if the condition of the patient be critical, have recourse to laparotomy. But making an outlet through the abdominal walls is of questionable benefit, unless accompanied by the more important part of the operation, viz.: the obliteration of septic pockets and establishment of perfect drainage through the vagina or rectum. But there are some abscesses producing serious symptoms before pointing below or externally, which were

originally, or have become, abdominal or supra-pelvic in character. These, according to the latest experience, should unquestionably be evacuated by means of laparotomy, whenever they cannot be reached extra-peritoneally. But a large majority of them are hæmatoceles, very many of which could and should have been operated upon from below, before a threatening abdominal abscess had developed. Therefore, under proper and timely treatment from the beginning of the attack, but few cases of pelvic abscess would require laparotomy.

PROFESSOR W. H. BYFORD wished to make two or three remarks with regard to certain abscesses which had not been touched upon during the evening, viz.: such as do not break, do not discharge, but remain as chronic cavities for a number of years. He had had an opportunity of tracing three such cases for twenty-three or four years, and in each of them there had been found serous in place of pus cavities. He accounted for it in this way: the lining membrane is an ulcerated surface, and he thought that in some of these cases instead of the pus being discharged these surfaces underwent cicatrization and that there was then a cicatrized cavity in which there was an amount of serum that dissolved the pus corpuscles and thus causing their disappearance so as to leave nothing but a clear collection of serum—a serous sac. In the three cases mentioned, when the sac was opened it was found to contain serum instead of pus. He had been very much interested in them and followed them up until he had proved to his satisfaction that this change actually did take place; a cicatrization of the whole lining membrane, converting it into a non-suppurating cavity containing serum.

PROFESSOR A. REEVES JACKSON said, replying to the questions that had been asked in regard to those cases in which an opening of the abscess was already established, and when

the health of the patient was not unfavorably influenced by the discharge, he would let the woman alone unless he could so enlarge the opening as to establish a thorough drainage. And in cases in which there was no opening and in which there seemed to be evidence of the existence of pus, he would endeavor to find it with the aspirator needle introduced through the vagina or abdominal wall in preference to opening through the rectum. In case drainage could be established perfectly through the vagina and abdominal wall he would rely upon that. Professor Jackson said that he had failed to make himself understood clearly in regard to the estimate he placed upon the treatment of the early stages of pelvic cellulitis. He approved of the vaginal douche, hot applications over the epigastrium, and opium, the latter being his sheet anchor, more particularly in peritonitis than in cellulitis. He thought that in many cases by lessening the pain the pulse was reduced and the temperature lowered. He simply felt that these methods of treatment do not reach the bottom of the difficulty, but in the absence of anything better he had always used them. He had never used leeches but thought they might be beneficial. The blood is not withdrawn directly from the congested vessels, but its loss may affect the part as would venesection in the arm or elsewhere. In conclusion, in a case of pelvic abscess, when a woman was dying from rapid pulse, high temperature and the constitutional disturbance that these things always bring in their train, other means having been tried unsuccessfully, he would perform laparotomy, because in many of these cases, even if the operation should fail, the patient is not made materially worse. He had come to believe that constant invalidism is not preferable to death.

III.—PROFESSOR DELASKIE MILLER reported a

Case of Epithelioma of the Uterus; Treated by Mercuric Nitrate; Result Six Years After Treatment.

This case derives its interest from the extent of the disease, the treatment, and the condition of the patient since treatment and now.

Mrs. R., wife of a physician, came under my care about eight years ago, affected with epithelioma of the uterus. When the case was first examined, a considerable portion of the cervix had disappeared and the disease had extended to the *os internum*. The hæmorrhage had been frequent and severe, and the ichorous discharge was constant. The general health had been greatly impaired.

Treatment.—Granulations were removed by the curette and nitric acid was applied. Tonics and a generous diet were added.

After a few weeks she left the city for her home, feeling better.

She again visited the city three months later. The disease had made further inroads upon the tissues of the uterus, and upper part of the vagina. Chloride of zinc was applied and reapplied. Apparent improvement followed.

The patient came to the city at intervals for about two years, and submitted to active treatment for several weeks each visit. Still the disease evidently advanced, though the symptoms were occasionally suppressed. The vaginal portion of the cervix had quite disappeared. The cavity of the uterus became involved, and the disease was extending over the upper part of the vagina, both anteriorly and posteriorly. The appetite, digestion and general strength were impaired to that degree that it was manifest the patient would succumb unless the disease could be promptly arrested.

The acid nitrate of mercury was chosen as the agent, and in the presence of Professor Jackson it was applied in the following manner: A roll of cotton two and a half inches in length, and as large as the canal would admit, was saturated with the acid nitrate of mercury and introduced, reaching into the cavity of the uterus and filling the cervical canal, and a small portion left dependent into the upper portion of the vagina. This application was left undisturbed *in situ* for seventy-two hours, and undoubtedly it is to this fact that the result is due.

After the cotton was removed an extensive slough came away. The subsequent granulations appeared healthy, and in two weeks the patient left the city, since which time I have not seen her.

This last application produced more than a local effect, viz., a more severe ptyalism than that which affected this patient it would be difficult to imagine, and this was attended by an intensely jaundiced appearance of the entire surface of the body.

The following extracts are from a letter received a few weeks ago from the husband:

"*My Dear Doctor:* I received your letter a few days ago; must acknowledge my carelessness in not writing to you; have often thought I ought to write to you in reference to my wife's condition and state of health since her last treatment. The current of time has borne us along on smooth waters, all enjoy reasonable health, peace and prosperity. Mrs. R., during the past four years, with the assistance of my daughter, has performed the duties of a housewife, with all the cares and work, except when she has been laid up for a day or two with sick headache. She has it to-day the second time in eight weeks; am giving her a new remedy which has increased the intervals between the attacks two weeks. I do not think the

ulceration has ever appeared since the last treatment; have not examined her with speculum for several years. The uterus rests upon the perineum and seems heavier than it ought to be, and of late has been the cause of much disturbance of the rectum, requiring its replacement. She suffers some pain occasionally, and the menses are sometimes very profuse. There has not been any discharge of water since you applied the nitrate of mercury. It was heroic treatment, but I believe it saved her life, and I shall ever feel grateful to you and Professor Jackson for your kindness towards Mrs. R. and myself."

W. W. JAGGARD, M. D.,

2330 Indiana Ave., April 12th, 1886. *Editor.*

CHICAGO MEDICAL SOCIETY.

Stated Meeting April 19, 1886. THE PRESIDENT, E. J. DOERING, M. D., IN THE CHAIR.

PROFESSOR G. C. PAOLI read a paper entitled

THE REASONS WHY FEMALE PHYSICIANS ARE DESIRABLE IN INSANE ASYLUMS.

He demonstrated that the most eminent specialists in psychiatry in the United States are a unit in maintaining that female physicians are best qualified for treating the female insane. Many states have passed laws requiring one female physician to be allotted to each one hundred female insane in their asylums.

DR. J. C. KIERNAN said eminent authorities had already pointed the relation which exists between uterine disease and insanity. Popular opinion is growing in favor of the employment of female physicians in the treatment of the female insane.

DR. WM. T. BELFIELD reported nine cases of

IMPERMEABLE STRICTURE TREATED BY ELECTROLYSIS.

During the past two years he has treated thirty-seven cases of stricture by electrolysis; and except for strictures located within an inch of the meatus, and for strictures of large calibre elsewhere, considers it preferable to dilatation and urethrotomy for the following reasons: 1. It will pass through any stricture, however tight, rigid, long or tortuous. 2. As a rule it causes no pain, bleeding, chill, nor urethral fever. 3. It is always devoid of danger. 4. Its effects are lasting.

In certain numerous cases electrolysis is not merely a preferable, but really the only practicable treatment. Such are, 1, old, rigid, cartilaginous strictures in men of middle or advanced age, where urethrotomy is dangerous and dilatation ineffectual; 2, impermeable strictures; 3, tight and rigid strictures with perineal or scrotal fistulæ.

DR. BELFIELD then narrated the successful treatment by electrolysis of nine such cases. In three of these there was complete retention of urine, the bladder being distended above the umbilicus; these strictures were absolutely impermeable to urine from within as well as to instruments from without. In each case a No. 10 electrode (French) was passed into the bladder in less than twenty minutes, permitting the immediate introduction of a catheter. In each of these cases perineal section would have been, without the battery, inevitable.

In the remaining six cases Dr. Belfield, as well as other surgeons, had failed in attempts to pass bougies into the bladder; yet as the patients were still enabled to force a feeble, dribbling stream outward, these strictures were theoretically permeable, though practically impermeable. In these also a small electrode readily entered the bladder in one or two sittings.

In one case, seen in consultation with Dr. Miller, the patient had a series of tight, rigid, impermeable strictures, and twenty-seven fistulous openings in the scrotum and perineum; he had submitted to both internal and external urethrotomy, and to numerous unsuccessful attempts at dilatation; was urinating every half hour, day and night. In fifteen minutes a No. 10 bulb entered the bladder; that night patient rose only once to urinate, and for the first time in several years the urine flowed entirely from the meatus and not from the fistulæ.

The unfavorable results obtained by various physicians in their attempts at electrolysis have been caused by the use of improper currents, whereby heat was generated and the urethra cauterized, causing violent inflammation and even extensive sloughing. When properly used, the heat produced is insignificant; with six to fifteen small cells and a weak fluid, the cicatricial tissue constituting the stricture is dissolved away but not cauterized. Since cicatricial tissue is but scantily supplied with blood, and is therefore poorly nourished, it yields to a dissolving current which is insufficient to disturb the healthy urethral tissues.

DR. L. L. MCARTHUR said he had treated with success by electrolysis one case in which numerous operations had already been performed. When patient came to him he could pass a No. 8 sound; used No. 9 electrode, and the patient can now pass No. 15 American sound. Never had any pain or difficulty in micturating since the operation.

DR. M. B. BROWN detailed two cases of impermeable and two of permeable stricture, in which he used electrolysis with good results.

PROFESSOR C. FENGER said he must confess that he was somewhat surprised by seeing the announcement of Dr. Belfield's paper "Nine Impermeable Strictures Treated by Electro-

lysis." He had tried electrolysis a few years ago, but never had any success from it. It surprised him that Dr. Belfield should meet with nine impermeable strictures in a very short period of time, while Sir Henry Thompson has only met with three impermeable strictures in his whole life. By hearing the paper read, however, he understood that Dr. Belfield does not mean to say that the strictures were impermeable in the strict sense of the word—the only correct one—but only meant that it was difficult to pass any instrument through these strictures. Sir Henry Thompson, in his "Diseases of the Urinary Organs," of 1882, p. 28, says: "Impermeability cannot be held to describe a character, a physical quality of the stricture itself, but rather indicates the quality of the surgeon who has treated it." Impermeable stricture is a contradiction in terms; it is not heard of so much now as it was twenty years ago. Dittl, of Vienna, in speaking about relative and absolute impermeable strictures, says a stricture may be impermeable for one man, or at a certain time, and permeable for another man, or at another time. Other modern authors on surgery, as König and Albert, speak about the matter in a similar way.

The second surprise for him was the advocated treatment by electricity, or electrolysis. There has always been in his mind a suspicious halo of mysticism about the electrolysis, whether applied to the different forms of surgical tumors or to strictures of the uretha. He understands from the paper that the electrolysis does not mean galvano-caustic treatment, although quite recently Jardin, of Paris, uses a small galvano-cautery knife for passing slowly through the stricture. Dr. Belfield warns very justly against cauterization. The non-caustic electrolysis is to me a very mystic process. Professor Fenger remembered years ago one of Billroth's clinics in which

he spoke about electrolytic treatment of venous angiomas of the face, that he expressed as the result of his experience the following: "The electrolytic needle has no more or other effect on the tumor in question than the mere mechanical disturbance of the tissue elements; that is, than any other needle not connected with a battery would produce."

Frankly, Professor Fenger said that the historical fate of electrolysis in strictures as well as elsewhere, up to date, has invariably been the following: Ever since Tripier, in 1864, and Mallez, in 1872, applied the electrolysis in strictures of the urethra, this method of treatment has come to the surface once every two or three years only to disappear again, and it has never been able to take any hold on the profession; not because it has not been tried, but rather because it has not been found superior, or even equal, to the other methods. Littel states that, on the rather promising representations of Tripier and Mallez, he tried electrolysis in three cases of very narrow stricture. It proved of no effect in any of the cases, and in one of them a local inflammation followed. Sir Henry Thompson does not even mention the electric treatment anywhere in his writings about strictures, but warns very emphatically against any method of cauterization. König says, in a very short appended notice, that only the short and soft strictures depending upon a polypus or warty growth of granulation tissue are proper objects for cauterization, either chemical (Duchamp) or galvano-caustic (Middeldorf). Otis, our American authority in this line of surgery, does not mention electrolysis with a word.

Newman, of New York (*Medical Record*, August 12-19, 1882), is not only the advocate of electrolysis in this country, but has written so assiduously and specified the method so minutely as to have it termed, in the foreign literature, "New-

man's method." In 1882 Newman's old and new cases numbered twenty-three only. In reporting Newman's articles for Virchow's *Jahresbericht*, Güterbock, of Berlin, says that "Newman's method has already, in 1872 and 1876, been criticised so thoroughly that not much more need be said about it." Dikmann, in New York *Medical Record*, Jan. 5, 1884, reports twenty-eight cases. Gräf, in Norway, reports in 1884, two cases treated by "Newman's method," and Verneuil, in 1884, recommends Jardin's method—that is, cauterization.

Thus the electrolytic treatment of stricture has been tried off and on for over twenty years, but has only taken hold here and there, sporadically, and for a short time. It has in the urethral, not any more than in the other fields of surgery, as yet to any extent replaced the more rational treatment by mechanical means.

The electrolysis may, however, have a further trial, and if the success in extensive resilient strictures, as in one of Dr. Belfield's cases, should prove to hold good for other cases of that kind, it is possible that this treatment will have a better fate in the future than it has had in the past.

DR. R. TILLEY said he did not consider electrolysis to be the proper term to be used in connection with the use of electricity in the manner suggested. Electrolysis, in the ordinary acceptation of the term, means the decomposition by electricity of water, or tissues, being in the nature of a chemical decomposition. He would like to know how far apart the electrodes were placed. (Dr. Belfield replied that the negative electrode was placed in the urethra, and the positive pole in any position on or near the penis, according to the effect intended). He could not see how electrolysis could be produced with the electrodes so far apart, and a weak fluid, without a cauterizing effect. From his extensive experience of cocaine in produc-

ing contraction of the tissues in the nose, he would expect to secure as good if not better results, reasoning by analogy, in its use in strictures of the urethra as in the use of electricity. He would think its internal application would be followed by wonderful results.

DR. W. T. BELFIELD closed the discussion by saying, in reply to Dr. Fenger's criticism, that these strictures were not impermeable, he would remind him that he called six of them "theoretically permeable, practically impermeable;" that is, a feeble stream was forced through, but no instrument could be introduced. The remaining three were absolutely impermeable to urine as well as instruments. They were water-tight, the bladder in each case being immensely distended. Dr. Fenger, in the cases where he attempted electrolysis, evidently made the usual mistake: he employed a strong current and *cauterized*, but did not electrolyze, the stricture. With a proper current he would probably have a better result. Sir Henry Thompson and Professor Dittl do not, it is true, endorse electrolysis; but he knows that neither of them has ever fairly tried it; they have contented themselves with the vague, unfavorable verdict of those who, having once or twice misused the current, attribute to the battery the faults which belong to themselves. Thompson's conservatism and intolerance are notorious; he bitterly opposed Bigelow's litholapaxy (without trying it) until it was adopted by everybody else.

Possibly, as Professor Fenger says, there is no "urgent necessity" for any other method than urethrotomy and dilatation; but surgeons who have to treat many such strictures as those described in the paper under discussion, think otherwise. These methods certainly possess one point of national economic value which electrolysis lacks, namely: they assist

in repressing the excess of population by quietly removing many patients.

Electrolysis "bobs up" and down only when ignorantly used; when properly employed it comes to stay.

To Dr. Tilley he would say that the action is properly termed "electrolysis;" it is the same effect as is seen in the decomposition of water, and is produced by the same current. During the action of the current a white foam and bubbles come up alongside the instrument. Cocaine causes contraction of blood-vessels in the urethra as well as in the nose; but it cannot, so far as he is aware, remove cicatricial tissue in either locality.

In conclusion, he would repeat that the secret of success lies in securing chemical force and avoiding heat; the former removes the stricture easily and painlessly; the latter causes violent inflammation and sloughing.

OSTEO-PLASTIC RESECTION.

PROFESSOR C. FENGER then presented a patient before the Society with the following words: I wish to bring this patient before the Society to illustrate the results of an operation called "osteo-plastic resection of the foot," and devised by Wladimnoff and Mikulicz. The operation consists in removal of the heel, soft parts and bones, and then uniting the remainder of the foot to the tibia in the position of an artificial pes equinus. As you will see, the patient has on a plaster cast from the toe to below the knee, and is able to walk in this cast without crutch or cane. He limps because the leg operated upon is two inches longer than the other one, and not because of inability to step on the leg. He will have in future to wear a high sole or heel under the well foot. While this plaster cast is being taken off I shall pass round the specimen of the removed heel and say a few words about the operation.

The patient had suffered for one year from a chronic traumatic osteomyelitis of the tarsus resulting in anchylosis of the joints, fistulæ on dorsal side of tarsus and a loss of substance of the skin of the heel. Pirogoff's or Syme's operation being out of the question, the choice was only between a supramalleolar amputation and the osteo-plastic resection. This operation was performed fourteen months ago. Union of the bones took place in from four to six months, and it is only the subsequent small operations for bringing the toes in dorsal flexion that have required so long a time before the patient has been able to commence to walk.

The plaster cast being now removed, you will find the foot in the axis of the leg in equinus position, the toes dorsally flexed to a right angle with the foot. There is active flexibility of the toes and some active mobility of the foot. This mobility, however, does not take place between the united surfaces of the tibia and fibula on the one side, and the scaphoid and cuboid bones on the other; as can be seen by examining the prominences representing the rudimentary newly formed malleoli—but the mobility takes place in the joints of the metatarsus. As to the question whether these joints will be able to bear the strain of the weight of the body during walking with the foot in this abnormal position, this patient of course proves nothing as yet. But from the other cases operated upon, in all nineteen, we can conclude that we have the right to expect a useful foot for walking. A patient operated upon by Socin, in Basle, is able without boot—the boot devised by Miculicz, which I now pass round for inspection—or cane to walk, but can walk all day long and perform a farmer's work in the field. You will further notice

that the walking surface of the foot, being the plantar surface of the heads of the metatarsal bones and the toes, is considerably larger than the surface which either a Syme's or a Pirogoff's operation would leave the patient to walk on. This, together with the active mobility of the toes, is regarded as an advantage that functionally places the osteo-plastic resection superior to the two other operations mentioned.

We find by examining the foot everywhere painless on pressure, and consequently there is nowhere any recurrence of the disease.

Miculicz feared that the anterior tibial artery might not be sufficient for the blood-supply of the foot, his method of operating dividing all the branches of the posterior tibial artery. I had the same apprehension, and changed the incision so as to save one of the terminal branches of the last-named vessel, namely, the internal plantar artery. This fear is not unfounded, as in one of Sordina's cases operated upon according to Miculicz's description, gangrene of the foot necessitated supramalleolar amputation on the fourth day. The mortality of the operation is as yet none, but as all the nineteen cases have fallen within the last few years except Wladimnoff's, and consequently have been treated antiseptically, it cannot be said that the danger is less than either in Syme's or Pirogoff's operation. There is no doubt that the functional results are far superior to that of a supramalleolar amputation even if the patient will always have to wear the Miculicz boot. Consequently it may be safe to say that osteo-plastic resection has already a legitimate place, although perhaps as yet not strictly enough defined, in the surgery of the tarsus.

The Society adjourned.

THE ANNUAL MEETING OF THE ILLINOIS STATE MEDICAL SOCIETY

Was held in Bloomington on May 18th and 19th. Dr. W. A. Byrd presided. The attendance of members was scarcely as large as usual, a fact owing doubtless, in part, to the recent meeting of the American Medical Association in St. Louis.

Most of the committees made their reports promptly, and a fair amount of work was done.

The following is a list of the officers elected for the year.

President—W. T. Kirk, Atlanta.

First Vice-President—E. Wenger, Gilman.

Second Vice-President—W. T. Ensign, Rutland.

Permanent Secretary—D. W. Graham, Chicago.

Treasurer—Walter Hay, Chicago.

Assistant Secretary—Henry J. Reynolds, Chicago.

Chicago is the next place of meeting.

The annual meeting will be held in accordance with the constitution, on the third Tuesday in May.

Committee on Arrangements—E. Ingals, Etheridge, Starkweather, Foster and Tilley, all of Chicago.

STANDING COMMITTEES.

Practice of Medicine—D. R. Brower, Chicago; A. K. Van Horn, Jerseyville; P. H. Oyler, Mt. Pulaski.

Surgery—Dr. D. A. K. Steele, Chicago; C. Goodbrake, Clinton; B. F. Crummer, Warren.

Obstetrics—E. A. Ingersoll, Canton; C. DuHadway, Jerseyville; W. H. Conibear, Morton.

Gynæcology—O. B. Will, Peoria; J. M. Armstrong, Edwardsville; Catherine Miller, Lincoln.

Drugs and Medicines—J. G. Topper, Elgin; T. M. Cullimore, Jacksonville; M. J. Mergler, Chicago.

Ophthalmology and Otology—S. J. Jones, Chicago; A. E. Prince, Jacksonville; C. R. Parke, Bloomington.

Necrology—E. Ingals, Chicago; William Hill, Bloomington; G. W. Cox, Clayton.

Publication—J. F. Todd, Chicago.

Diseases of Throat and Nose—E. F. Ingals, Chicago.

Dermatology—Henry J. Reynolds, Chicago.

Diseases of Children—G. W. Jones, Danville; E. J. Shipp, Petersburg.

Physiology—A. Wetmore, Waterloo.

Judicial Committee—C. C. Hunt, Dixon; A. T. Barnes; Bloomington; L. G. Thompson, Lacon.

Medical and Sanitary Legislation—B. M. Griffith, Springfield; J. L. White, Bloomington; W. A. Haskell, Alton; A. B. Strong, Chicago.

Biographical—J. H. Hollister, Chicago; E. P. Cook, Mendota; E. Ingals, Chicago; G. W. Jones, Danville; F. B. Haller, Vandalia; T. F. Worrell, Bloomington; Robert Boal, Peoria; H. R. Guthrie, of Sparta.

The Incurable Insane—A. T. Barnes, Bloomington.

THE ANNUAL MEETING OF THE AMERICAN MEDICAL ASSOCIATION

Was held in St. Louis on May 4th, 5th, 6th and 7th. The attendance of members was unusually large, and numbered about eleven hundred, including representatives from nearly every state in the Union, and from some of the territories. Rather more than the usual amount of work was done in the general sessions and in the sections. Much good feel-

ing prevailed, contrary to what seems to have been anticipated by some, and but little occurred to mar the pleasure attending the meeting. The provision made by the local committee of arrangements for convenience of registration was exceptionally good, and the entertainments, general and private, tendered the Association were ample to satisfy the most exacting. The following is a list of the officers elected for the year.

OFFICERS FOR 1887:

President—Dr. E. H. Gregory, St. Louis, Mo.

1st Vice-President—Dr. E. H. Miller, of Stillwater, Minn.

2nd Vice-President—Dr. W. B. Welch, of Boonesboro, Ark.

3d Vice-President—Dr. William H. Pancoast, of Philadelphia.

4th Vice-President—Dr. William C. Wile, of New London, Conn.

Permanent Secretary—Dr. William B. Atkinson, of Philadelphia.

Assistant Secretary—Dr. J. Nevins Hide, of Chicago, Ill.

Treasurer—Dr. R. J. Dunglison, of Philadelphia.

Librarian—Dr. C. H. A. Kleinschmidt, of Washington, D. C.

Committee on Necrology—Dr. J. M. Toner, of District of Columbia, Chairman; Ala., Jerome Cochran; Ark., C. Watkins; Cal., Beverley Cole; Col., T. H. Hawkins; Conn., Frank H. Whittemore; D. Columbia, C. H. A. Kleinschmidt; Del., Lewis P. Bush; Fla., R. B. Burrows; Ga., R. Battey; Ill., L. H. Montgomery; Ind., J. F. Hibberd; Iowa, J. Williamson; Kan., C. V. Mottram; Ky., R. M. Farleigh; La., J. W. Duprè; Me., A. J. Fuller; Mass., M. G. Parker; Md., T. B. Evans; Mich., S. S. H. French; Miss., B. F. Kittrell; Mo., L. Bremer; Minn., W. W. Mayo; Neb., E. M. Whitten; N. H., J. J. Berry; N. J., I. N. Quimby; N. Y., John Shrady; N. C., Eugene Grissom; Ohio, J. F. Baldwin; Pa., D. G. Brinton; R. I., C. W. Parsons; S. C., R. A. Kinloch; Tenn., J. Y. Crawford;

Tex., J. W. McLaughlin; Ver., E. F. Upham; Va., George B. McCorkle; W. Va., J. H. Pipes; Wis., S. S. Riddell; U. S. Navy, J. C. Speir; U. S. Army, M. K. Taylor; U. S. Mar. Hosp. Service, H. S. Auston; Dak. Ter., J. B. Van Velsor; N. M., G. W. Hansom.

Committee on State Medicine.—Ala., G. A. Kitchen; Ark., J. A. Dibrell, Jr.; Cal. F. H. Terrill; Col., P. R. Thomas; Conn., Geo. B. Porter; D. Columbia, J. D. Patterson; Fla., E. T. Sabal; Ga., J. A. McGaston; Ill., J. H. Hollister; Ind., J. H. Beasley; Iowa, P. W. Lewellyn; Kan., S. Schenck; Ky., Wm. Bailey; La., C. W. Day; Mass., M. C. Ledwood, Ira Russell; Md., John Morris; Mich., H. B. Baker; Miss., M. S. Grafft; Mo., J. M. Allen; Minn., W. A. Stenchfield; Neb., A. R. Mitchell; N. H., G. P. Conn; N. J., E. L. B. Godfrey; N. Y., E. S. F. Arnold; N. C., C. J. O. Hagan; Ohio, H. J. Sharp; Pa., W. Sniveley; R. I., W. T. Parker; S. C., C. Kolbrock; Tenn., J. B. Nowling; Tex., C. H. Wilkinson; Vt., H. D. Holton; Va., J. E. Chancellor; W. Va., S. D. Wilson; Wis., C. Alexander; U. S. N., A. L. Gihon; U. S. A., E. McClellan; U. S. M. H. Service, W. H. Long; Dak., J. B. Van Velsor; N. M., W. R. Tipton.

Members of Judicial Council.—N. S. Davis, Ill., H. Brown, Ky.; William Brodie, Mich.; D. J. Roberts, Tenn.; R. C. Moore, Neb.; T. A. Foster, Me.; James A. Gray, Ga.

Trustees of THE JOURNAL.—P. O. Hooper, Ark.; A. Garcelon, Me.; L. S. McMurtry, Ky.

Place of next meeting, Chicago, Ill., the first Tuesday in June, 1887; Chairman of the Committee of Arrangements, Charles Gilman Smith, M. D., of Chicago.

The next annual meeting will be held in Chicago, in June, 1887.

THE AMERICAN SURGICAL ASSOCIATION met in Washington, D.C., on May 28th and continued in session four days. Professor Moses Gunn presided. Many good papers were presented and discussed.

A proposition was considered by the Association to organize a CONGRESS, to be formed by the various SPECIAL SOCIETIES in the United States, and to meet annually in Washington. Its further discussion was deferred to the next annual meeting, and a committee was appointed to consider the proposition and to report next year.

By some it is charged that this is but an attempt to supplant the American Medical Association by those who no longer feel an interest in the prosperity of the old National Association, which it must be admitted represents more fully than any other in existence in our country, the whole medical profession in the United States.

THE AMERICAN LARYNGOLOGICAL ASSOCIATION held its annual meeting in Philadelphia, Pennsylvania, on May 27th, 28th and 29th. Dr. Harrison Allen presided. The number and the character of the papers presented during the session gave evidence of the interest taken in that specialty, and of the progress made in it in the last few years.

Professor E. F. Ingals, of this city, was elected president for the next year.

THE ASSOCIATION OF AMERICAN MEDICAL EDITORS met in St. Louis on May 3rd. The annual address of the President, Professor H. O. Walker, M. D., of Detroit, was delivered and the annual election resulted in the selection of

Professor John V. Shoemaker, M. D., of Philadelphia, for president.

The Association was tendered a banquet by the Medical Press and Library Association of St. Louis.

THE NINTH INTERNATIONAL MEDICAL CONGRESS.

At the meeting in St. Louis, on May 3rd, of the executive committee of the International Medical Congress of 1887, the existing vacancies in the presidencies of the congress and of sections were filled. The section of otology and laryngology was divided, and the section of laryngology was restored. Professor N. S. Davis, of Chicago, Illinois, was elected president of the congress. Supervising surgeon-general J. B. Hamilton, of the Marine Hospital service, was elected secretary-general. Professor A. B. Palmer, of the University of Michigan, was elected president of the section of pathology. Professor J. F. Harrison, of the University of Virginia, was elected president of the section of gynæcology, and Professor J. H. Callender, of the Nashville and Vanderbilt University, president of the section of physiology. Dr. H. O. Marcy requested to be transferred from the section of collective investigation, etc., to the section of gynæcology, which was done, and Medical Director A. L. Gihon, of the United States Navy, was elected president of the section of collective investigation, etc. Professor A. W. Calhoun requested transfer from the presidency of the section of ophthalmology, which was acceded to, and Professor E. Williams, of the Miami Medical College of Cincinnati, was elected president of the section of ophthalmology. Dr. W. H. Daly, of Pittsburg, Pennsylvania, was elected president of the section of laryngology.

The office of associate secretary-general was abolished.

Very satisfactory reports were made to the committee of replies received from prominent members of the medical profession in Europe, indicating their intention to attend the congress and to furnish papers.

Having completed the preliminary organization of the congress, so far as the more important official positions are concerned, and arranged the details of the work in preparation, the executive committee adjourned.

The Enlarged Committee of Arrangements of the American Medical Association was instructed at the meeting in New Orleans, last year, to revise the report of the preliminary work of organizing the Ninth International Congress made at that meeting, and it reported at St. Louis that it had revised the work and made some few changes in the organization, and adopted rules for the government of the Congress, and selected general officers for the congress and presidents of sections who together should constitute an *executive committee*, and that to this executive committee the affairs of the congress had been committed. This report of the committee of arrangements was received by the American Medical Association and unanimously adopted, thereby discharging its committee of arrangements and ending all official connection of the Association with the congress. Therefore the future work of preparation for the opening of the congress in September, 1887, is left entirely in the hands of the executive committee, and the local committee of arrangements in Washington.

A correct list of the officers of the congress to this date is as follows:

GENERAL OFFICERS OF THE INTERNATIONAL CONGRESS OF 1887.

President—N. S. Davis, M. D., LL. D., Chicago, Illinois.

Vice-Presidents—Wm. Brodie, M. D., Detroit, Michigan; W. W. Dawson, M. D., Cincinnati, Ohio; J. A. Grant, M. D., Ottawa, Canada; E. M. Moore, M. D., Rochester, New York; Tobias G. Richardson, M. D., New Orleans, Louisiana; Lewis A. Sayre, M. D., New York, N. Y.; J. M. Toner, M. D., Washington, D. C.; The President of the American Medical Association; The Surgeon-General of the United States Army; The Surgeon-General of the United States Navy; The Supervising Surgeon-General of the United States Marine Hospital Service.

Secretary-General—John B. Hamilton, M. D., Washington, D. C.

Treasurer—E. S. F. Arnold, M. D., F. R. C. S., New York, N. Y.

Chairman of the Finance Committee—Richard J. Dunglison, M. D., Philadelphia, Pennsylvania.

Executive Committee of the Congress—Henry H. Smith, M. D., Chairman, Philadelphia, Pennsylvania; Abram B. Arnold, M. D., Baltimore, Maryland; E. S. F. Arnold, M. D., F. R. C. S., New York, N. Y.; Wm. T. Briggs, M. D., Nashville, Tennessee; J. H. Callender, M. D., Nashville, Tennessee; N. S. Davis, M. D., LL. D., Chicago, Illinois; F. S. Dennis, M. D., F. R. C. S., New York, N. Y.; Richard J. Dunglison, M. D., Philadelphia, Pennsylvania; Albert L. Gihon, M. D., Medical Director U. S. Navy, Washington, D. C.; John P. Gray, M. D., LL. D., Utica, New York; John B. Hamilton, M. D., Washington, D. C.; James F. Harrison, M. D., Virginia; S. J. Jones, M. D., LL. D., Chicago, Illinois; Joseph Jones, M. D., New Orleans, Louisiana; DeLaskie Miller, M. D., Chicago, Illinois; A. B. Palmer, M. D., LL. D., Ann Arbor

Michigan; Wm. H. Pancoast, M. D., Philadelphia, Pennsylvania; A. R. Robinson, M. D., New York, N. Y.; J. Lewis Smith, M. D., New York, N. Y.; Jonathan Taft, M. D., Cincinnati, Ohio; F. H. Terrill, M. D., San Francisco, California; E. Williams, M. D., Cincinnati, Ohio.

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PRESIDENTS OF THE SECTIONS.

General Medicine—Abram B. Arnold, M. D., Professor of Clinical Medicine, Baltimore, Maryland.

General Surgery—William T. Briggs, M. D., Professor of Surgery, Nashville, Tennessee.

Military and Naval Medicine and Surgery—Henry H. Smith, M. D., formerly Professor of Surgery and Surgeon-General of Pennsylvania, Philadelphia, Pennsylvania.

Obstetrics—DeLaskie Miller, M. D., Ph. D., Professor of Obstetrics, Chicago, Illinois.

Gynæcology—James F. Harrison, M. D., Professor of Obstetrics, etc., University of Virginia.

Therapeutics and Materia-medica—F. H. Terrill, M.D., Professor of Therapeutics, San Francisco, California.

Anatomy—William H. Pancoast, M. D., Professor of Anatomy, Philadelphia, Pennsylvania.

Physiolgy—J. H. Callender, M. D., Professor of Physiology, Nashville, Tennessee.

Pathology—A. B. Palmer, M. D., LL. D., Professor of Pathology, etc., Ann Arbor, Michigan.

Diseases of Children—J. Lewis Smith, M. D., Professor of Diseases of Children, New York, N. Y.

Ophthalmology—E. Williams, M. D., Professor of Ophthalmology and Otology, Cincinnati, Ohio.

Otology—S. J. Jones, M. D., LL. D., Professor of Ophthalmology and Otology, Chicago, Illinois.

Laryngology * * *

Dermatology and Syphilis—A. R. Robinson, M. D., Lecturer on Dermatology and Syphilis, New York, N. Y.

Public and International Hyhiene—Joseph Jones, M. D., Professor of Clinical Medicine, etc., New Orleans, Louisiana.

Collective Investigation, Vital Statistics and Climatology—Albert L. Gihon, Medical Director U. S. Navy, Washing, D. C.

Phychological Medicine and Nervous Diseases—John P. Gray, M. D., LL. D., Professor of Psychological Medicine, etc., Utica, New York.

Dental and Oral Surgery—Jonathan Taft, M. D., Professor of Dental and Oral Surgery, Cincinnati, Ohio.

DOMESTIC CORRESPONDENCE.

LIABILITY FOR MISTAKES IN DISPENSING DRUGS.

TO THE EDITORS OF THE *Chicago Medical Journal and Examiner.*

Gentlemen:

A recent case occurred in Iowa which has been largely noticed by medical journals within the last few weeks. The facts are that the druggist was filling a prescription, calling for extract of dandelion, from a jar containing extract of belladona, and a customer proceeded to help himself. The symptoms caused were so immediate and violent that the prescription was not dispensed. The customer brought suit against the druggist, who instituted the defense that the customer was a trespasser in helping himself, and could not hold the apothecary responsible. The defense was brushed aside by the court, who held that, if the customer took the dose from the same jar used by the apothecary, it was under an implied promise to pay, and in this view of the case he could not be held to be a trespasser. The apothecary was held liable in damages.

With the justice of the above ruling in this case but little fault can be found, but the theory of an implied promise to pay presupposes consent on the part of the druggist; and the question then arises, what constitutes "consent," and must it be expressed or implied? Another possible ruling, suggested by the case, is that every individual must exercise at least

ordinary care to protect himself from injury or accident, and that in taking articles not directly dispensed by the druggist, he is guilty of gross carelessness and ought not to recover, though he may not be technically a trespasser.

MEDICUS.

BOOK REVIEWS.

DIAGNOSIS OF DISEASES OF THE BRAIN AND OF THE SPINAL CORD. *By* W. R. GOWERS, M. D., F. R. C. P., ASSISTANT PROFESSOR OF CLINICAL MEDICINE IN UNIVERSITY COLLEGE; PHYSICIAN TO UNIVERSITY COLLEGE HOSPITAL AND TO THE NATIONAL HOSPITAL FOR THE PARALYZED AND EPILEPTIC. *Pp. VIII, 293. New York:* WILLIAM WOOD & CO. *Chicago:* W. T. KEENER.

This work bears the same relation to the general subject of the diseases of the nervous system that one on physical diagnosis does to internal medicine. The object is to give the student a clear idea of the general principles upon which a diagnosis is made, and only so much of anatomy and physiology as will enable him to come to a conclusion.

The first eighteen lectures are devoted to the study of the brain and its disorders and are published in response to a request from many readers of the author's work on the "Diagnosis of the Diseases of the Spinal Cord." Those who have formed a high opinion of Professor Gowers' work will not be disappointed by a perusal of this work on the brain. He brings to the task the same ripe clinical experience, thorough knowledge of all the latest researches in this special branch,

and lastly a keen appreciation of the difficulties which beset the beginner.

The last portion of the book is merely a reprint of the author's work on the cord. It is not mentioned in the preface, and is evidently merely bound in the volume by the publishers. This arrangement leads to a certain want of continuity which the reader will find does not exist when studying these disorders.

We trust the author will remedy this defect by incorporating these two excellent monographs in a larger work on the "Diagnosis of Diseases of the Nervous System."

H. N. M.

A GUIDE TO THE PRACTICAL EXAMINATION OF URINE. *For the use of physicians and students. By* JAMES TYSON, M. D., *Professor of General Pathology and Morbid Anatomy in the University of Pennsylvania; one of the Physicians to the Philadelphia Hospital; Fellow of the College of Physicians of Philadelphia, etc., etc., etc. Fifth edition. Revised and corrected. With colored plates and wood engravings. Pp. XII, 249.*

That the profession has called for five editions of this manual within a comparatively short time is evidence of its value. Within the last few years much has been added to our knowledge of the chemistry of the urine. Facts have been observed and theories propounded without number, and like other rapidly advancing sciences our knowledge is at the same time more than we can use and less than we desire.

From this mass of new material Professor Tyson has carefully selected the most useful portions, and those which have stood the test of experience. The new tests for albumen, and

the increased importance of the peptones and mucin receive full consideration.

The work is not a treatise on the chemistry of the urine, but as a working manual for the office and laboratory it has no superior. H. N. M.

THE FIELD AND LIMITATION OF THE OPERATIVE SURGERY OF THE HUMAN BRAIN. *By* JOHN B. ROBERTS A. M., M. D., *Professor of anatomy and surgery in the Philadelphia Polyclinic, surgeon to St. Mary's Hospital. Large octavo, pp. 80. Philadelphia:* P. BLAKISTON, SON & CO. *Chicago:* W. T. KEENER.

This essay is a reprint of a paper presented to the American Surgical Association at the 1885 meeting. To those not having a copy of the transactions of the Association, we would say the work contains a complete epitome of the present status of cerebral surgery. It is to be regretted that the valuable discussion which followed the reading of this paper is not appended to the reprint.

BOOKS RECEIVED.

Electricity in Medicine. By Ambrose L. Ranney, M. D. New York: William Wood & Co. Chicago: W. T. Keener.

A Manual of Operative Surgery. By Lewis A. Stimson, B. A., M. D. Second edition. Philadelphia: Lea Brothers & Co. Chicago: A. C. McClurg & Co.

The Blot Upon the Brain. By William W. Ireland, M. D., Edin. New York: G. P. Putnam's Sons. Chicago: A. C. McClurg & Co.

The Principles and Practice of Medicine. By Charles Hilton Fagge, M. D., F. R. C. P. Volume I. Philadelphia: P. Blakiston, Son & Co. Chicago: W. T. Keener.

The Science and Art of Surgery. By John Eric Erichsen, F. R. S., LL.D., F. R. C. S. Philadelphia: Lea Brothers & Co. Chicago: A. C. McClurg & Co.

The Diseases of Sendentary and Advanced Life. By J. Milner Fothergill, M. D. New York: D. Appleton & Co. Chicago: A. C. McClurg & Co.

Transactions of the American Surgical Association. Volume III. Philadelphia: P. Blakiston, Son & Co. Chicago: W. T. Keener.

An Atlas of Clinical Microscopy. By Alexander Peyer, M. D.

The Principles and Practice of Surgery. By John Ashurst, Jr., M. D. Fourth edition. Philadelphia: Lea Brothers & Co. Chicago: A. C. McClurg & Co.

Lectures on the Principles of House Drainage. By J. Pickering Putnam. Boston: Ticknor & Co. Chicago: A. C. McClurg & Co.

A Manual of Microscopical Technology. By Stephen Yates Howell, A. M., M. D. New York: G. P. Putnam's Sons. Chicago: A. C. McClurg & Co.

Essentials of Vaccination. By W. A. Hardaway, M. D. St. Louis: J. H. Chambers & Co.

Insanity and its Treatment. By G. Fielding Blandford, M. D., Oxon. New York: William Wood & Co. Chicago: W. T. Keener.

Diseases of the Spinal Cord. By Byrom Bramwell, M. D., F. R. C. P., (Edin.). New York: William Wood & Co. Chicago: W. T. Keener.

A Compend of Pharmacy. By F. E. Stewart, M. D., Ph. G. Philadelphia: P. Blakiston Son & Co. Chicago: W. T. Keener.

Saint Bartholomew's Hospital Reports. Volume XXI. Edited by W. S. Church, M. D., and John Langton, F. R. C. S. London: Smith, Elder & Co.

Twelfth Annual Report of the Secretary of the State Board of Health, of the State of Michigan.

The Principles and Practice of Surgery. By Frank Hastings Hamilton, A. M., M. D., LL.D. New York: William Wood & Co. Chicago: W. T. Keener.

A Treatise on Bright's Disease of the Kidneys. By Henry B. Millard, M. D., A. M. New York: William Wood & Co. Chicago: W. T. Keener.

A Reference Handbook of the Medical Sciences. Volume II. New York: William Wood & Co. Chicago: W. T. Keener.

The International Encyclopædia of Surgery. Volume VI. New York: William Wood & Co. Chicago: W. T. Keener.

Dictionary of Practical Surgery. Edited by Christopher Heath, F. R. C. S. Philadelphia: J. B. Lippincott & Co. Chicago: A. C. McClurg & Co.

Handbook of Practical Medicine. By Dr. Hermann Eichorst. New York: William Wood & Co. Chicago: W. T. Keener.

A Manual of the Diseases of the Skin. By Balmano Squire, M. D., London. Chicago: A. N. Marquis & Co.

Lectures on Dietetics and Dyspepsia. By Sir William Roberts, M. D., F. R. S. London: Smith, Elder & Co. Chicago: A. C. McClurg & Co.

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A Manual of Surgery. Volume I. Philadelphia: Lea Brothers & Co. Chicago: A. C. McClurg & Co.

Surgical Diseases of the Kidneys. By Henry Morris, M. A., M. B., F. R. C. S. Philadelphia: Lea Brothers & Co. Chicago: A. C. McClurg & Co.

A Manual of Surgery. Volume II. Philadelphia: Lea Brothers & Co. Chicago: A. C. McClurg & Co.

The Student's Manual of Venereal Diseases. By Berkeley Hill, M. D., and Arthur Cooper, M. D. Philadelphia: P. Blakiston, Son & Co. Chicago: W. T. Keener.

A Manual of Surgery. Volume III. Philadelphia: Lea Brothers & Co. Chicago: A. C. McClurg & Co.

The Surgical Diseases of Children. By Edmund Owen, M. B., F. R. C S. Philadelphia: Lea Brothers & Co. Chicago: A. C. McClurg & Co.

The Genuine Works of Hippocrates. By Francis Adams, LL.D. Volume I. New York: William Wood & Co. Chicago: W. T. Keener.

Diseases of the Digestive Organs in Infancy and Childhood. By Louis Starr, M. D. Philadelphia: P. Blakiston, Son & Co. Chicago: W. T. Keener.

First Annual Report of the State Board of Health of the State of Kansas.

The Best Preliminary Education for the Study of Medicine. Boylston Prize Essay, 1885.

Drainage for Health, or Easy Lessons in Sanitary Science. By Joseph Wilson, M. D. Philadelphia: P. Blakiston, Son & Co. Chicago: W. T. Keener.